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ISBN 0-315-55465-7

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THE UNIVERSITY OF ALBERTA

Evaluation of Consequences in Auditor Judgment

BY

Morina Dianne Rennie ©

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND
RESEARCH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY

IN

ACCOUNTING

FACULTY OF BUSINESS

EDMONTON, ALBERTA

FALL 1989

THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR: Morina Dianne Rennie

TITLE OF THESIS: Evaluation of Consequences in Auditor Judgment

DEGREE: Doctor of Philosophy

YEAR THIS DEGREE GRANTED: 1989

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THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled: Evaluation of Consequences in Auditor Judgment submitted by Morina Dianne Rennie in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Accounting.

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ABSTRACT

The purpose of this dissertation was to provide evidence regarding auditors' judgment processes surrounding evaluation of outcomes. Two phases of judgment involving the evaluation of outcomes are:
1) the bridging of the output of the information processing stage and the action choice stage through assessment of possible outcomes of potential actions, and
2) the feedback phase through reacting to outcomes of past actions.

For both of these phases of judgment it was hypothesized that mental simulation may play a role. A conceptual framework was described and a method of gathering evidence regarding the role of simulation in each of these phases of judgment was outlined and carried out. Audit managers and accounting students participated in the experiments.

For the phase of judgment involving the evaluation of possible consequences of potential actions, the methodology consisted of having some subjects, before a judgment task, explain the course of events leading up to a particular negative outcome. This task was intended to cause the activation of representations in memory (priming) of events in that causal chain and the connections between those representations provided that the subject has relevant experience so as to have developed sufficiently strong connections.

Two types of judgments were utilized so as to demonstrate a situation in which the effect of priming on auditors and on non-auditors would be similar (non-auditing task) and one for which priming would affect auditors but not non-auditors (an audit judgment task).

Results did not support the hypothesis that mental simulation of outcomes of potential actions is an element of audit judgment. Some results from the non-auditing experiment suggested that the priming methodology could be useful in further research into this proposed process.

There was support for the use of counterfactual simulation in responding to negative outcomes. In particular the presence versus the absence of an easily undoable action in the course of events leading up to the negative outcome affected the assessments of regret and criticism. Priming of an alternative course of events marginally affected these assessments.

ACKNOWLEDGEMENT

I want to express my gratitude to the members of my dissertation committee, Michael Gibbins (chairman), Peter Tiessen, and Gary Wells.

I am also thankful for the financial support during my course of studies provided by the Institute of Chartered Accountants of Saskatchewan, the Social Sciences and Humanities Research Council of Canada, and The University of Alberta .

Finally, I would like to thank the auditors and university students who participated in the research, as well as the university instructors and the accounting firms who facilitated this participation.

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CHAPTER 1

INTRODUCTION

The primary purpose of this research was to examine the elements of audit judgment involving the evaluation of the outcomes of actions. Researchers in the fields of psychology and cognitive science have suggested that the simulation of mental models may be the means by which such processing takes place.

This dissertation was designed to provide evidence about the presence of mental simulation in two phases of audit judgment. First, evidence was sought to determine whether the auditor's judgment process includes consideration of the consequences of potential actions and to test the assertion that such an evaluation is aided by a process of mental simulation of events expected to occur as a result of a proposed action. Second, evidence was sought to test the proposition that the auditor's judgment process in evaluating past consequences (i.e., feedback) includes the mental simulation of alternative courses of events to those actually occurring.

This research is intended to fit into the body of literature whose goal is to describe auditor judgment. The scientific interest in this type of research is in understanding the judgment process of a particular type of expert, the financial statement auditor.

The judgment of the financial statement auditor is of particular interest for two reasons. First, the auditor plays an important role in the North American economy. The judgment of the financial statement auditor is relied upon by stock market participants, creditors, labour negotiators and many others.

Second, the auditor is an appealing subject for the study of expertise, having had a distinctive set of educational experiences and having been shaped in a unique working environment. Two aspects of the environment that may have an impact on the development of the auditor's judgment skills are: uncertainty and an incentive structure that is peculiar to the auditing profession.

The auditor deals daily with uncertainty. The audit process can be modeled as the measurement and control of various types of risks where the ultimate goal is to achieve a tolerable overall risk that the audited financial statements are materially misstated. Because this risk can never be eliminated, there is always an element of uncertainty regarding the outcome of the audit and thus of any judgment made during the course of the audit.

Another aspect of the auditor's working environment is an incentive structure that emphasizes the avoidance of negative outcomes rather than the pursuit of positive outcomes (Gibbins and Wolf, 1982, p. 51).

The management team of the audited company is responsible for the preparation of the company's financial statments which are, in some sense, a report on management's effectiveness. The auditor's role is to provide assurance that these financial statements are not materially incorrect.

The auditor has an incentive not to displease management (for example, by raising the audit fee to allow a more thorough audit or by refusing to concur on an accounting issue) for fear of being replaced by management as the company's auditor. However, excessive willingness to concur with management on accounting issues or insufficient audit effort could possibly result in a lawsuit brought by financial statement users. The best outcome of an audit is maintenance of the status quo (i.e., continuance of the audit).

The existence of severely negative potential outcomes serves as an incentive to auditors to avoid actions that are associated with these outcomes. Thus, consideration of these potential outcomes can impact the auditor's day-to-day judgment processes and also the sorts of skills learned by the auditor.

Research seeking evidence that helps us understand the judgment process of the financial statement auditor can make a contribution to both the accounting literature and the broader field of expert judgment.

Ashton, Kleinmuntz, Sullivan and Tomassini (1988, p. 100) point out that such research can also be of benefit to auditing practice.

> One important reason for emphasizing the descriptive approach is that despite the proliferation of decision support and expert systems technologies, much of the auditor's effectiveness still rests on his/her ability to process information, select and interpret evidence and draw appropriate conclusions....If we hope to understand and improve the quality of audit decision making we need to understand both how the experienced auditor thinks and how to train the inexperienced auditor.

Ashton et al. (1988, p. 104) identify eight elements of audit judgment (modified from a model by Hogarth, 1980). These elements are:

"1. Task definition
2. Internal information acquisition
3. External information acquisition
4. Information processing
5. Output
6. Action
7. Outcome
8. Feedback"

Gibbins (1984, p. 115) theorized that there is a bridging process between the output of information processing (preferred response) and the action. This is said to include a process of identifying the likely outcome if the preferred response is enacted.

It is desirable that a descriptive theory of auditor judgment include all elements of judgment and thus be based upon research addressing each element. Much of the behavioural research in auditing has concentrated on the second through fifth elements of judgment - that is, internal information acquisition, external information acquisition, information processing, and to some extent output. Less research has been done to identify the thought process involved in the later elements of judgment (output through feedback).

Interestingly, much non-behavioural auditing research gives a prominent role in its characterization of judgment to the elements of judgment that have received so little attention in the behavioural literature. The expected utility maximizing auditor (in accordance with the expected utility/subjective expected utility model) acts "as if" s/he evaluates probabilities and utilities of all possible consequences of all possible actions, determines the expected utility of each potential action choice and chooses the action associated with the maximum expected utility.

For example, Kinney (1975) in developing a decision theoretic model of the audit process builds the costs of client disatisfaction, litigation and loss of reputation into the utility maximizing auditor's loss function. Antle (1984) and Baiman, Evans and Noel (1987) use a principal-agent setting to predict the behaviour of the utility maximizing auditor-agent under various conditions. Balachandran and Nagarajan (1987) provide analysis of the incentive effects of different legal systems on the utility maximizing auditor.

DeAngelo (1981a)(1981b) looks upon the auditor-client relationship as a bilateral monopoly and examines the auditor's system of incentives with respect to audit quality and independence. Theoretical work by Simunic (1980) employing a utility maximizing auditor was the basis for a series of empirical studies on the pricing of audit services (e.g. Simunic, 1980; Palmrose, 1986; Simon, 1985; and Chung & Lindsay, 1988).

The use by non-behavioural auditing researchers of models stressing the assessment of consequences is reasonable given the uncertain audit environment. Although the subjective expected utility model may be a valid paramorphic model of choice under uncertainty, we are in need of a descriptive model of how this process occurs if we hope to develop a descriptive theory of auditor judgment.

Although there has been some research (reviewed in chapter 2) dealing with the later phases of judgment (output through feedback), there has been no research directly addressing the question of how this process takes place (if at all). The behavioural auditing literature has also not examined the process by which the auditor responds to the feedback obtained through experiencing/observing the consequences of past actions.

This dissertation is intended to be the beginning of a research programme examining the phases of audit judgment in which consequences of actions are evaluated. The objective of this research was to test the assertion that the auditor does evaluate consequences of actions (both before and after the consequence has occurred) and is aided by a process of mental simulation.

Chapter 2 is a review, first, of the main streams of auditor judgment literature and then, of the body of research that does in some way address the issue of consequence evaluation by auditors. In chapter 3 a conceptual framework for the use of mental simulation in consequence evaluation is developed. In chapter 4 the method used in the study is outlined. Chapter 5 contains the results of the study and discussion of those results. Chapter 6 is the summary and conclusion.

CHAPTER 2

REVIEW OF THE LITERATURE

Over the past two decades a variety of approaches have been used to study the expert judgment of financial statement auditors. Policy capturing experiments were common early on in the literature (beginning in the early 1970's). A second stream of research identifying heuristics and biases in auditor judgments became popular in the late 1970's and early 1980's. More recently, the focus has moved toward an effort to understand the judgment process and knowledge structures underlying that process (the cognitive approach). Two paradigms have emerged - the process tracing/dynamic model approach and the theoretical/hypothesis testing approach. This dissertation is intended to be a contribution in the last of these areas - the cognitive approach using a theoretical/hypothesis testing method.

This chapter will briefly outline developments in the policy capturing, heuristics & biases, and process tracing/dynamic modeling approaches to the study of auditor judgment. Then the theoretical/hypothesis testing approach with emphasis on those studies addressing the issue of outcome evaluation will be discussed in greater depth.

2.1 Policy capturing studies:

Paramorphic modeling in psychology began with the introduction of the lens model (Brunswik, 1952). Judgments about the environment are viewed as being made through a set of cues extracted therefrom.

In the first policy capturing study in the auditing field, Ashton (1974a, 1974b) modeled auditors' internal control assessments. Subsequent research using internal control assessment tasks have been variations of the original study: Joyce (1976), Ashton & Brown (1980), Hamilton & Wright (1982), Gaumnitz, Nanamaker, Surdick and Thomas (1982), Tabor (1983), Abdel-Khalik, Snowball and Wragge (1983), Nanni (1984), Srinidhi & Vasarhelyi (1986).

Other types of judgments studied in this paradigm were materiality assessments (Boatsman and Robertson, 1974; Moriarity and Barron, 1976, 1979; Messier, 1983; and Krogstad, Ettenson and Shanteau, 1984)); evaluation of forecasts (Danos & Imhoff, 1983); initial planning (Kaplan & Reckers, 1984) and analytical review (Arrington, Hillison & Jensen, 1984).

The auditor judgment studies in the policy capturing paradigm have focused primarily on the third of the eight elements of judgment described earlier--external information acquisition. (These elements were identified in Ashton et al., 1988, p. 104.)

2.2 Heuristics & biases studies:

A first step toward understanding the process by which judgments are made occurred through contrasting the outputs of human judgment with those prescribed by normative models and then proposing heuristics that might explain the differences.

Tversky and Kahneman (1974) outlined three heuristics that may be used to simplify complex decision tasks: anchoring and adjustment, availability, and representativeness.

They suggested that when we assess probabilities and predict values we anchor on some probability/value and then adjust from this anchor (often insufficiently) to make the assessment required.

Studies using auditors as subjects have revealed evidence of the anchoring and adjustment heuristic in estimation of non-probabilistic values: Joyce & Biddle (1981a), Mock & Turner (1981), Kinney & Uecker (1982), Biggs & Wild (1985) and Boritz, Gaber & Lemon (1987).

Some auditing studies have shown that use of different methods of eliciting probability distributions has caused differences in the distributions generated (Corless, 1972; Felix, 1976; Crosby, 1980, 1981; Kinney & Uecker, 1982: and Butler, 1986). These findings are consistent with Tversky and Kahneman's (1974) contention that different elicitation methods suggest different anchors from which people insufficiently adjust.

Tversky and Kahneman (1973) proposed that we treat ease of recall (availability) as a surrogate for probability when making many types of judgments. Libby (1985) utilized the availability heuristic to infer the content of expert auditors' knowledge structures. This study will be discussed later.

The representativeness heuristic occurs when "the subjective probability of an event, or a sample, is determined by the degree to which it: (i) is similar in essential characteristics to its parent population; and (ii) reflects the salient features of the process by which it is generated" (Kahneman & Tversky, 1972, p. 431). Among the symptoms of use of this heuristic are the underutilization of base-rate information and insensitivity to sample size.

Results consistent with the representativeness heuristic were observed by Swieringa, Gibbins, Larsson and Sweeney (1976) in auditing contexts (student subjects). Gibbins (1977) replicated the Swieringa et al. study with auditors as subjects. Uecker and Kinney (1977) and Joyce and Biddle (1981b) also found evidence consistent with auditors' use of this heuristic.

In terms of the eight elements of judgment described earlier (from Ashton et al., 1988), the heuristics and biases research has tended to address the fourth and fifth stages: information processing and output.

2.3 The cognitive approach:

The cognitive approach to the study of auditor judgment reflects the shift in focus in the psychology literature toward understanding cognitive processes. Researchers in both traditional experimental psychology and artificial intelligence are studying the issues of knowledge representation and judgment process but have tended to use rather different methodological approaches.

This divergence in cognitive psychology has been paralleled in the field of auditor judgment research. One stream has taken up the artificial intelligence methods of process tracing and computer programmed dynamic models. The other stream has followed the more traditional methods of experimental psychology. This section will be divided into two major parts: first, the process tracing/dynamic modeling approach will be discussed and second, the theoretical/hypothesis testing approach will be reviewed.

2.3.1 Process tracing/dynamic modeling approach:

The process-tracing approach found its roots in the work of Newell and Simon (1972) who described the process of having subjects "think aloud" during problem solving. The goal of this type of research is to model the decision process through computer programmes. These programmes are seen as dynamic theories describing the individual's judgment process.

An early attempt at research of this sort in an auditing-related task was carried out by Bhaskar and Dillard (1979) who modeled accounting judgments of experts and novices. This effort was followed up by a series of protocol/information search studies examining judgments related to internal control: Biggs & Mock (1983), Bedard (1986), Meservy, Bailey & Johnson (1986), Hansen & Messier (1986), Biggs, Messier & Hansen (1987).

Other judgments studied have been: analytical review (Biggs, Mock and Watkins, 1988); materiality assessments (Steinbart, 1987); uncollectible accounts estimates (Dungan and Chandler, 1985); and fraud detection (Johnson, Jamal and Berryman, 1989; Johnson and Jamal, 1987)

In terms of the eight elements of judgment described earlier (from Ashton et al., 1988), this research focuses on the second, third and fourth: internal information acquisition, external information acquisition, and information processing.

2.3.2 Theoretical/hypothesis testing approach:

This section will be divided into three subsections. First, theory building articles will be summarized; second, prominent empirical research that does not address outcome evaluation will be reviewed; and finally, research that relates to outcome evaluation by auditors will be discussed.

2.3.2.1 Theory building:

Gibbins (1984) modeled audit judgment in the form of 21 propositions based on work in other literatures and on observations of and interviews with public accountants. He characterized the judgment process as involving the retrieval of a template. (The template/schema/knowledge structure is a representation that ties together knowledge in memory (Van Dijk and Kintsch, 1983, p. 307.)) Templates are developed through the education and experience of the auditor and are more well-developed for routine than for non-routine judgment situations.

The (unconscious) choice of a template is determined by the situation at hand but may also be affected by its availability in memory. The template accessed specifies a preferred response. The possible consequences of enacting this preferred response are considered before a final justifiable action is chosen. This process is carried out with the aid of knowledge about the cause-effect relationships between actions and outcomes. Undesirable potential outcomes serve as constraints on the feasibility of actions associated with such outcomes.

Waller and Felix (1984b) presented a descriptive model of evidence acquisition and evaluation. They proposed two types of knowledge structures: template-schemas for declarative knowledge ("knowing that") and procedural-schemas for procedural knowledge ("knowing how").

They conjectured that template-schemas are organized in the form of a network of nodes and links (p. 32). The procedural-schemas are organized as hierarchies of production rules. A production rule specifies a preferred action associated with a given set of conditions (a condition-action pair). These conditions may involve external information or information acquired from an activated template-schema

(p. 33).

The procedural-schemas control the retrieval and instantiation (assignment of values) of template-schemas against which to compare the situation at hand. If the fit between the situation and the template-schema is suitable, a preferred action can be generated through the appropriate production rule. Information search is also controlled by the procedural-schemas.

Waller and Felix (1984c) also conjectured about how the auditor's knowledge structures are developed through education and experience. They suggested that learning takes place through both top-down and bottom-up processes (p. 385). That is, the knowledge structures help determine what new knowledge will be assimilated, and then they are altered by this learning. "The retrieved knowledge both clarifies and is clarified by new experiences" (p. 386). On-the-job experience is most important in the development of the structures with which the auditor makes many of his judgments.

2.3.2.2 Prominent empirical research not addressing outcome evaluation:

Work by Weber (1980) follows the psychology research on category knowledge. Auditors and students recalled types of computer controls that had previously been read to them. The auditors recalled significantly more controls than did the students. He also found significantly more clustering by control category for the auditors than for the students.

Ashton and Ashton (1988) found support in an internal control context for a model of evidence combination based on the anchoring and adjustment heuristic. This model, developed by Einhorn & Hogarth (1985), asserts that when people revise probabilities based on new evidence, the order of evidence aquisition will affect the final probability assessment.

Several experiments have used causal reasoning tasks. Kida (1984) looked at auditors' choice of information that would enable them to test the hypothesis that a company would fail (or remain viable). Those auditors testing the failure (viability) hypothesis tended to choose more failure (success) oriented information.

Libby (1985) used a hypothesis generation task to gain some insight into the knowledge structures of auditors. Audit managers were given an analytical review anomaly and were asked to generate hypotheses about the cause. He found that the potential errors hypothesized were clustered by transaction cycle suggesting that potential errors may be organized in memory this way (p. 664).

Frederick and Libby (1986) used the conjunction fallacy (see Tversky & Kahneman, 1983) to learn more about the knowledge structures of auditors. Auditors and students ranked the likelihood of possible effects of internal control weaknesses. The authors predicted that the auditors' expert knowledge of internal control errors would cause them to make a different type of conjunction error than would be made by students. The results supported this prediction suggesting that auditors have knowledge of both accounting relationships and internal control, while students have knowledge only of accounting relationships.

Waller and Felix (1987) studied auditors' covariation judgments (covariation is one "cue to causality" hypothesized by Einhorn & Hogarth, 1986). They found that prior expectation did not affect covariation judgments for most subjects. Also, experience did not affect covariation judgments.

Waller and Felix (1989) studied causal reasoning of auditors in an internal control related task. They found (as hypothesized) that when making forward causal inferences (How likely would Y be caused by X?), auditors tended to use information about other factors that could enhance/reduce the chance of Y occurring in the presence of X. They also found (as hypothesized) that when making backward causal inference (How likely did X cause Y?), auditors used information about alternative possible causes of Y.

Recall that the eight elements of judgment as described by Ashton et al. (1988, p. 104) are "(1) task definition, (2) internal information acquisition (from memory), (3) external information acquisition (from other sources), (4) information processing, (5) output, (6) action, (7) outcome, and (8) feedback." The prominent experimental studies described above have focused on the second and fourth of these: internal information acquisition and information processing.

As was observed earlier, the other major paradigms in behavioural auditing research (policy capturing, heuristics and biases, and process tracing) have studied elements of judgment involving internal information acquisition, external information acquistion, information processing and to some extent output. The later phases of judgment (action, outcome, and feedback) have not received quite as much attention from experimental researchers. All three of these later elements involve the outcomes of actions. The action choice involves consideration of future potential outcomes of proposed actions. The outcome element is the occurrence of the outcome. And the feedback element is the response to that outcome. The following section reviews the studies that have in some way addressed issues related to these elements of audit judgment.

2.3.2.3 Research related to outcome evaluation by auditors:

The research relating to consequences in auditing has been diverse and much is only indirectly related to the issue of whether auditors evaluate consequences as part of the judgment process. The research is of two types: experimental studies and self-report studies.

2.3.2.3.1 Experimental studies:

The experimental research that follows consists of several studies that have looked at various audit judgments from an expected utility or at least an outcome perspective. None of them directly addresses the issue of how auditors take consequences of their actions into account or whether this is even an element of judgment.

Ward (1976a)(1976b) studied factors influencing auditors' materiality judgments. To do this he had auditors sort, by importance, possible outcomes of failure to detect an error. The outcomes ranking highest in importance were "Loss of future engagements with client" and "Injury to professional pride."

Ward also asked the subjects to choose the monotonically increasing functional form that best represented the relationship between magnitude of an undetected accounts receivable error and adverse economic consequences that would be suffered by the auditor (i.e., a loss function). Most of the subjects chose a function that levels off at some point. However, the study did not look into the issue of whether the auditors utilize these loss functions in the process of making judgments.

Newton (1977) also studied materiality judgments. Utility curves for the auditor subjects were constructed by having the subjects relate outcomes of accounting estimates to decisions to qualify the audit opinion. Lewis (1980) asked auditor subjects to rank possible outcomes (state/action pairs) of a lawsuit contingency judgment. He found that outcomes were ranked consistently by the auditors. Note that the outcomes in these two studies were outcomes of the audited company, not those of the auditor.

A. Ashton (1982) studied, in an auditing context, a phenomenon known as the Allais paradox--a deviation from one of the axioms underlying subjective expected utility theory (see R. Ashton, 1982, pp. 64-65 for a description of the axioms). In one task, the auditor subjects were to assume that they were deciding whether to qualify the audit opinion. Payoffs associated with the action of qualifying (receipt of current fee only or receipt of nothing) and with the action of not qualifying (receipt of current fee only, receipt of future and current fees, or receipt of nothing (lawsuit costs offset fees)) were given. The probabilities of each of these payoffs were also provided. She found that the proportion of violations of the irrelevance axiom (i.e., Allais paradox) was much smaller for the audit judgment task than for the original non-auditing gambles that were given to a group of the auditor subjects.

In this experiment it was apparently assumed that auditors do take into account consequences (payoffs) when making audit judgments. However, Ashton received 35 unsolicited comments about the task. "These subjects typically voiced strong objection to the notion that auditors might consider audit fees, client retention or potential lawsuits as inputs to their decision making" (R. Ashton, 1982, p. 158). For example, one comment from the managing partner of one of the firms was, "The costs and benefits to the firm, and the consideration that we may or may not be rehired, play no part in determining whether we would qualify our auditors' report" (A. Ashton, 1982, p. 422).

The results of Ashton's study are consistent with auditors' conformance with the irrelevance axiom of SEU theory in consideration of the outcomes of proposed actions. However, the result is also consistent with the auditors' not using these outcomes at all in coming to their decision as was suggested by the unsolicited comments (A. Ashton, 1982, p. 424).

Farmer, Rittenberg and Trompeter (1987) studied the impact of potential loss of client and potential lawsuit on auditor judgments. These two factors were chosen as an operationalization of the auditor's reward structure. Farmer et al. hypothesized that after employees join an auditing firm they go through an acculturation process in which they take on the values of their reference group.

Auditors (staff, seniors, managers and partners) and students were given a case about a difficult accounting decision. Subjects were asked to decide whether the transaction should be handled in the way suggested by the client or not.

The results produced "mild support" for the authors' theory regarding acculturation of audit staff in that there was some similarity of the responses of lower and higher level auditors. They also found that the loss of client and lawsuit variables significantly affected decisions as to how to record the transaction.

Waller and Felix (1984a) studied auditors' responses to feedback. They examined the effect of incomplete outcome feedback on auditors' perceptions of their judgment ability in an internal control reliance decision. They found that different base rates for successful outcomes affected auditors' self-perceived judgment ability.

2.3.2.3.2 Self-report studies:

Four studies have used a self-report methodology in examining questions related to consideration of outcomes of auditors' actions. Gibbins and Wolf (1982) had respondents (auditors) to a questionnaire list all the possible post-audit events they could think of together with their likelihood and importance. Most of the events listed by respondents were negative events; but negative events were considered less likely to occur than positive events. On average the negative events were considered as important as the positive events. Loss of client and discovery of errors were the two most important post-audit events. These events had relatively low mean likelihoods.

Gibbins and Emby (1985) sent questionnaires on professional judgment in public accounting to auditors in five countries (77% of 156 responded). Respondents were asked questions which were intended to reveal their characterization of auditor judgment, judgment situations encountered, the sequence of events in certain judgments, and the incidence of consultation in making these judgments. Several hypotheses drawn from the Gibbins (1984) article were tested.

They found that auditor judgment tends to occur in response to an outside stimulus and that the judgment process involves several steps. A response preference is felt before enough information is gathered to justify this preference. Most subjects believed that they explicitly weigh the consequences of error in making most judgments. Consultation with colleagues was seen as an important part of the judgment process.

Emby and Gibbins (1988) reported on additional questions in one of these questionnaires (88 sent; 69 returned). Respondents were asked questions related to the factors in good judgment. Respondents coded their factors into 12 categories identified in the questionnaire. They also ranked the factors identified as to importance. The categories representing the most important factors (after adjusting for number of factors identified) were: good consequences produced, minimized likelihood of bad consequences, evidence found to support decision, and maximized likelihood of good consequences.

Respondents then gave assessments of the justification required in familiar and unfamiliar situations with possible consequences varying from all positive to all negative. It was found that more justification would be needed for the unfamiliar relative to familiar situations. There were differences among respondents as to the amount of evidence needed as more of the possible consequences became negative (for some it increased and for some it decreased after a point).

As noted by the authors (p. 311), this retrospective questionnaire was unable to determine if the quality of judgments was being evaluated by anticipated consequences of action choice or by actual (ex post) consequences. They call for further research to shed light on this issue.

Gibbins and Mason (1988) sent questionnaires on professional judgment to auditors and to accountants in industry. Each respondent received two cases requiring the exercise of professional judgment. The decisions given in response to these cases varied among auditors and between auditors and accountants in industry. Respondents were then asked a series of questions about their professional judgment process. When asked if they tend to identify consequences of their judgments, only 1 of the 52 respondents said this was never done.

The studies utilizing the self-report methodology have elicited important information about auditors' perceptions of their judgment processes. However, because the ability of people to access their thought processes has been questioned (e.g. Nisbett & Ross, 1980, pp. 202-227), such findings must be verified using experimental methods in which cognitive processes are inferred from the effect on behaviour of controlled manipulation of relevant variables. Thus, there is a need for experimental research which can tell us whether consequences are considered by auditors during the judgment process. In addition, none of the past research has revealed the process by which the evaluation of the outcomes of potential actions is carried out (if such evaluation does occur).

2.4 Summary

Three research trends have been discussed in this chapter. Researchers in the policy capturing and heuristics paradigms have not been interested in auditor judgment issues involving evaluation of consequences of actions, preferring instead to focus on other inputs to and/or phases in the judgment process. Over the same time period there have periodically been experimental studies addressing some aspect of the outcomes of auditor's actions but rarely looking specifically at the issue of whether (and never at how) these outcomes are taken into account during the judgment process.

As the attention of researchers shifts towards attempts to describe (rather than represent) the cognitive processes by which auditors make decisions, the need for more research taking a cognitive approach to the issue of consequence evaluation is apparent.

There seems to be disagreement among auditors as to the presence of this element in their judgment process. Auditors questioned by Gibbins and Emby (1985), Emby and Gibbins (1988) and Gibbins and Mason(1988) suggested that they do assess consequences of potential actions during the process of making audit judgments. However, auditors sending in responses to the Ashton (1982) study believed that assessment of consequences is not an element of audit judgment.

The current research is viewed as a contribution to the literature that takes the cognitive approach to audit judgment and which addresses the aspect of judgment involving consequences of actions. It is hoped that this research will provide evidence regarding two thought processes about outcomes:

1) Whether possible outcomes of potential actions affect the action choice of the auditor and if the simulation of mental models could be the process by which the evaluation of these outcomes occurs. This is the phase of judgment that bridges the output and action elements in the framework described by Ashton et al. (1988) and discussed earlier. The bridging process is described by Gibbins (1984, pp. 115-116).

2) Whether past outcomes are evaluated by comparing them to counterfactual alternative outcomes derived through a process of mental simulation.

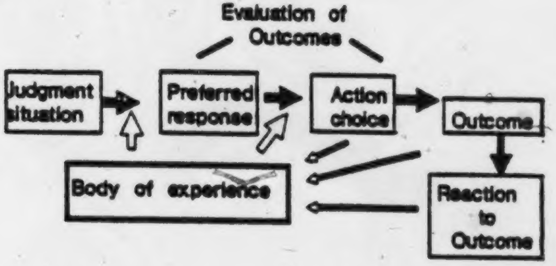
The next chapter outlines a conceptual framework for the research and reviews empirical studies that support the proposed process.

CHAPTER 3

CONCEPTUAL FRAMEWORK FOR USE OF MENTAL SIMULATION IN CONSEQUENCE EVALUATION

There are at least two types of occasions on which an auditor might be expected to consider the consequences of his/her actions. The first of these is during the phase of judgment where s/he is considering a potential action and the possible consequences of that action. The second type of occasion is when the auditor has just experienced the consequences of a past action. The auditor's response to this outcome will be added to a body of experience (i.e., feedback) that the auditor can then use in future judgments - in particular, the evaluation of possible consequences of future actions. The relationship between the evaluation of past and future outcomes is illustrated in Figure 1.

Figure 1: Relationship between evaluation of past and future outcomes.



This chapter will be divided into two sections, the first dealing with the aspect of judgment involving the assessment of possible consequences of potential actions and the second dealing with the evaluation of consequences of past actions. The following sections are designed to develop a framework of evaluation of consequences by combining ideas from the auditing, psychology, cognitive science and engineering control literatures. Hypotheses following from the conceptual framework are then presented.

3.1 Evaluation of outcomes of potential actions:

There are several theories addressing the evaluation of outcomes. Some are variants of expected utility theory that have been adapted to account for observed deviations from the normative model--e.g., Prospect theory (Kahneman and Tversky, 1979); Regret theory (Bell, 1982)(Loomes and Sugden, 1982); and Expectancy theory (Lawler, 1973). Tversky's (1972) Theory of elimination by aspects can also be applied to risky choice situations through re-interpretation of "aspects" and adjustment of the decision rule. Finally, the large stimulus-response literature in the field of learning assumes that it is anticipated consequences that control behaviour.

However, these theories do not deal with the cognitive process by which outcomes are evaluated during the course of judgment. In this dissertation, the idea that mental simulation is the cognitive process by which this evaluation of outcomes takes place is proposed and tested. It is an attempt to explore an area that is left by traditional risky choice theories as a black box.

3.1.1 Mental simulation in evaluation of outcomes of potential actions:

The financial statement auditor faces considerable uncertainty as to the outcome of an audit and thus of any judgment made during the course of that audit. (See Gibbins & Wolf, 1982 for auditors' views of the potential outcomes of audits.) The likelihoods of possible outcomes depend on a variety of economic, legal and societal factors. The auditor has strong incentives to take possible consequences into account when making judgments because certain of these consequences can do the auditor much damage. Thus, the evaluation of consequences of proposed actions is a process in which it would be rational for the auditor to utilize mental simulation given the complexity of the network of possible events to be assessed and the recognized cognitive limitations of human beings.

Gibbins (1984, pp. 115-116) suggests a process by which auditors consider consequences of actions. He suggests that a preferred response to a judgment situation and the action eventually chosen are bridged by a causal inference process wherein the consequences likely to follow from enactment of this preferred response are generated. Undesirable consequences serve as constraints on the feasibility of potential actions associated with such outcomes. The causal connections between particular actions and consequences are learned through experience.

The process described by Gibbins is consistent with the notion that people can, in their minds, construct a causal chain of events that could be initiated by a particular action. This process has been termed mental simulation or simulation of mental models. Thuring and Jungermann (1986, p. 166) note that, "... mental models are constructed to simulate the potential behavior of a domain, i.e., they capture its dynamics and are not a merely static representation."

It has been suggested by researchers in the psychology, cognitive science and engineering control literatures that the process of evaluating possible consequences of a proposed action may occur through a process of mental simulation (e.g., see Jungermann and Thuring, 1987; Oden, 1987; Rasmussen, 1979).

The proposed process is described by Rumelhart, Smolensky, McClelland and Hinton (1986, p. 42):

> ...we could "run a mental simulation" and imagine the events that would take place in the world when we performed a particular action. This mental model would allow us to perform actions entirely internally and to judge the consequences of our actions, interpret them, and draw conclusions based on them.

It may be that the simulation of mental models can account for the remarkable ability of humans to function in an enormously complex environment. "The efficiency of humans in coping with complexity is largely due to the availability of a large repertoire of different internal models of the environment from which rules to control behaviour can be generated ad hoc" (Rasmussen, 1979, p. 8). Rumelhart et al. (1986) suggest that the construction and manipulation of mental models may be the highest form of human reasoning.

It has been found that mental simulation seems to be a process that is most naturally evoked in the face of negative outcomes (Gleicher, Kost, Baker, Strathman, Richman, and Sherman, 1988; Landman, 1987; Meyerowitz & Chaiken, 1987). Because the incentive structure of the auditor gives more emphasis to negative than positive outcomes, auditors may be particulary adept at utilizing the process of mental simulation.

Mental simulation is a possible mechanism through which auditors could act "as if" they are maximizing subjective expected utility (SEU) much of the time. This proposed process allows one to generate an action choice taking into account certain inputs to the SEU maximization problem but without requiring a global assessment of all possible outcomes (and their probabilities) following from all possible actions. It may be that experts in a domain may have experienced relevant cause-effect relationships so often as to be able to construct very effective mental models with which to aid judgment.

The idea that a real process can be modeled by the mind was described over four decades ago by Craik (1943/1952). He restricted his discussion to the realm of models of physical processes. Decades later, the idea of "internal" or "mental" models appeared in the engineering control literature. Those monitoring physical systems are thought to utilize a mental model of that system in order to simulate the effects of comtemplated actions on the system.

It has been suggested that among those utilizing mental models of systems are: air traffic controllers (Whitfield & Jackson, 1982), operators in nuclear power plants (Sheridan, 1981), and electronics repairmen

(Rasmussen & Jensen, 1974). Conant and Ashby (1970) provided a proof that the best regulator of a system must utilize an internal model of that system.

There has also been interest in the cognitive science area in mental models. Mental models have been studied for: bouncing balls (Forbus, 1983), doorbells (Brown & de Kleer, 1981), thermostats (Kempton, 1986), heat exchangers (Williams, Hollan & Stevens, 1983), physical motion (McCloskey, 1983), and chess moves (D'Andrade, 1981), among others.

Jungermann, Schutz and Thuring (1988, p. 153) propose that physicians construct and simulate mental models of how pharmaceutical drugs work on the body and so can generate the consequences of use of these drugs.

Tversky and Kahneman (1973) extended the idea of mental models to suggest that people can construct models of social systems as well as of physical systems. (They called the process, "construction of scenarios" at the time.) Ease of construction serves as a clue to the likelihood of the occurrence of the scenario.

Later they expanded on these ideas (Kahneman & Tversky, 1982a) suggesting that in order to make certain judgments people use a process that "resembles the running of a simulation model" (p. 201). They posit that the "manipulation of mental models" is a means of planning under uncertainty (p. 206).

The process could be used to estimate the consequences of a proposed action in order to decide whether this action should be carried out. The particular consequences that one envisages and the feelings arising from such consequences (e.g. regret) provide information about the desirability of such an action.

3.1.2 Representation of mental models:

Kahneman and Tversky (1982a), in their discussion of mental simulation, seem to be talking about models that are constructed as required as opposed to being retrieved intact from memory and then "run." In contrast, the control literature--although not dwelling on the issue--seems to assume the retrieval of an existing model of the relevant physical system.

The issue of whether the model exists in memory as a separate unitary representation or is created as required is also faced by those researching schemas. Some researchers in that field claim that schemas are separate abstract representations of knowledge in memory. Others suggest that abstract knowledge need not be stored. Such knowledge can be derived from memory traces of specific experiences upon retrieval (Hintzman, 1986). Alba and Hasher (1983, p. 225) in their thorough review of the literature related to schemas/knowledge structures state: "We think it clear that the stored record of any event is far more detailed than prototypical schema theories imply."

Similarly there may be controversy as to whether mental models are constructed as required or are retrieved intact from memory. However, it should be possible to discover whether the process of mental simulation takes place, whatever the form of the representation. The behavioural implications, the simulation process itself and the environmental effects would not differ under these conceptualizations.

For purposes of exposition, I will describe the mental model as one that is constructed as required for two reasons:

1) It is my perception that the psychology literature is moving away from the unitary abstraction view of the schema and toward the more flexible conceptualization of a schema that is created as required (e.g. Alba & Hasher, 1983; Hintzman, 1986; Rumelhart, Smolensky, McClelland and Hinton, 1986);

2) Rasmussen (1979, p. 17) suggested that internal

models could be represented by a "distributed parallel processing" network (as in computers). However, he did not elaborate on this suggestion. There is now a theory of parallel distributed processing to describe human cognition and this theory can be adapted to incorporate the construction of mental models.

The parallel distributed processing (PDP) approach to the microstructure of cognition (see Rumelhart & McClelland, 1986) takes the view that the mind consists of basic units and learned connection strengths between these units. (These units could be interpreted as neurons.) Concepts are represented by patterns of activation of these units. The pattern of activation is determined by the level of excitation of units. Units or sets of units might represent various properties of objects such as colour, shape, smell, or name. Excitation of one unit (or set of units) can lead to a representation of all the properties of an object due to the connection strengths between the units associated with that object. The process of learning is "a matter of finding the right connection strengths so that the right pattern of activation will be produced under the right circumstances..." (McClelland, Rumelhart & Hinton, 1986, p. 32).

Mental simulation can be explained in terms of the

PDP approach (Rumelhart, Smolensky, McClelland & Hinton, 1986, p. 40). Rumelhart et al. (1986) propose the existence of two kinds of units. One type receives inputs and settles on a pattern of activation which suggests an appropriate action. The other type takes a representation of a proposed action as input and indicates what might happen if this action were carried out (p. 41).

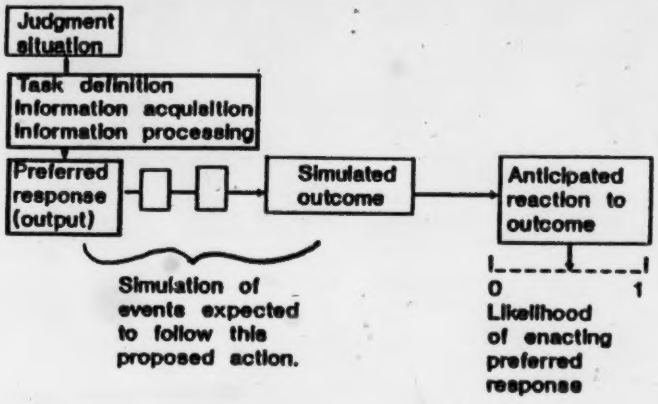
The mechanism through which this process may occur can be described in terms of patterns of activations of units and connection strengths between units. Bindra (1976) suggests that not only are there associations between patterns of activations of objects and their properties but also between patterns of activations representing events. Contingency relationships between events are learned through experience. The more times events are observed to co-occur the greater the strength of connection between them. Thus the occurrence of Event A may lead to an automatic activation of the set of neurons (units) which represents Event B. This will cause the expectation that Event B will follow Event A.

Many contingency relations involving a particular type of event could be learned - both those events that it causes and those that it affects. In this way, these contingency relationships could result in the activation of a series of neural patterns representing a chain of events causing the expectation of the occurrence of a chain of events leading from the occurrence of one event. This could be described as mental simulation. (Note that this process need not be conscious (Montgomery, p. 88)).

The judgment process is assumed to begin with exposure to a judgment situation. Ashton, Kleinmuntz, Sullivan and Tomassini (1988, p. 104) suggest that the auditor then goes through a process of defining the task, acquiring internal and external information, and processing that information. There are several theories in the fields of psychology and accounting that conjecture upon how this information processing stage takes place.

In any case, the information processing stage yields output - a preferred response (i.e., a potential action). The activation of this potential action's representation causes a chain reaction of activations of events expected to follow that action. The simulated consequence leads to a reaction to that consequence which aids in the decision as to whether to carry out the action. The process is illustrated in Figure 2:

Figure 2: Process of generating preferred response and consequence


Judgment situation
Task definition
Information acquisition
Information processing
Preferred response (output)
Simulated outcome
Anticipated reaction to outcome
Simulation of events expected to follow this proposed action.
0
1
Likelihood of enacting preferred response

If the simulated consequence is satisfactory (not necessarily optimal), then the "action" element of judgment (from Ashton, et al., 1988) can take place followed eventually by the outcome and feedback phases. (The outcome and feedback phases are addressed in section 3.2.)

If, on the other hand, the simulated consequence is unsatisfactory, then the likelihood of enactment of this preferred response is small. (There may be some small likelihood of enactment if other actions assessed later are perceived to lead to worse outcomes--one's view of what is satisfactory may have to be adjusted.)

After simulating an unsatisfactory outcome for a particular potential action, an alternative potental action will be generated and then be evaluated through simulation of a chain of events expected to follow such an action. This process will continue until one finds a potential action choice associated with a satisfactory outcome. Thus the process being proposed is sequential and stops upon finding a satisfactory solution (satisficing).

The chain of events involved in any particular mental simulation can be simple or complex. As an individual acquires more knowledge about a domain, s/he will be able to perform more complex simulations related to that domain. That is, the simulation can be run at a greater level of detail, taking into account many intermediate cause-effect relationships that the novice would be unaware of. Because the expert has intimate knowledge of relevant cause-effect relationships, s/he may be able to simulate chains of events very rapidly and may not even be conscious that a simulation has occurred in routine judgment situations.

The associations that enable mental simulation to take place are learned through one's life-long experience. The auditor learns the relationships between possible actions and ensuing chains of events through his/her own audit experience or by the direct observation, reading or hearing of other auditors' experience. Gibbins and Wolf (1982, p. 46) note that

"If an event usually follows an action, people tend to form an expectation that the event is an outcome of the action, and this helps them decide whether to act or not. The expectation itself, whether conscious or unconscious, is learned from observation and experience."

3.1.3 Research supporting the proposed process:

The following studies provide evidence that people may use mental simulation in making assessments related to possible future events. Evaluation of possible future consequences of potential actions falls into this category of reasoning. However, there has been no previous published work directly addressing the hypothesis that mental simulation is utilized to evaluate the consequences of proposed actions.

In each of these studies subjects first do a task (priming task) which is designed to activate neural patterns representing a chain of events leading up to a particular outcome. This makes it possible to incorporate these particular events in a mental simulation for a subsequent judgment task with very little cognitive effort. Jungermann and Thuring (1987, p. 255) propose that pre-activation of representations makes them more easily retrievable from memory and thus more likely to be included in the simulation of a mental model.

Ross, Lepper, Strack and Steinmetz (1977) had subjects read the case histories of clinical patients and explain particular outcomes in the lives of these patients in terms of these case histories. The control group read the case histories but were not given specific life outcomes to explain. Subjects who had given the explanation of the antecedents to particular outcomes later judged the likelihood of those outcomes to be higher than did control subjects.

This result can be explained in terms of the greater ease of construction of a scenario in which contingency relationships have recently been activated. That is, the task of explaining the outcomes primed the subjects for the task of estimating the likelihood of these outcomes. The ease of construction of a scenario leading up to the outcome influenced their likelihood assessments.

Carroll (1978) asked subjects to imagine the occurrence of a particular future event (e.g. Jimmy Carter/Gerald Ford winning the presidential election). Priming the subjects in this way affected their later assessments of the probability that Jimmy Carter would win the election. Another group of subjects were given an outcome and asked to explain how it might occur (as well as imagining the outcome). The ensuing likelihood estimates were the same as those of subjects who had only imagined the occurrence of the outcome. Thus, it appears that both of these methods of priming may have the effect of activating contingency relationships leading up to a particular outcome, making the events represented more easily imaginable when a mental simulation is subsequently carried out.

Sherman, Skov, Hervitz and Stock (1981) asked subjects to explain their own hypothetical success (failure) on an anagram task. This explanation process affected likelihood estimates of success as well as performance on the anagram task.

Gregory, Cialdini, and Carpenter (1982) had subjects imagine, through a structured scenario, that certain events happened to them (e.g. winning a contest, being arrested for armed robbery). Imagining of these occurrences led subjects to later give higher likelihoods (than control subjects) that this event would happen to them. In another experiment, it was also found that subjects' imagining themselves using a cable television service made them more likely to agree to subscribe when contacted by a "cable salesperson" weeks later.

It was concluded from these experiments that the priming task allowed greater subsequent ease of the relevant mental images to take place. It was also suggested that construction of a particular sequence of events may impair one's ability to consider alternative sequences leading to different outcomes.

Sherman, Zehner, Johnson and Hirt (1983) had subjects explain a hypothetical victory by a football team about which they read certain information. This affected subjects' (relative to control group) assessments of the likelihood of the occurrence of this outcome. The authors explained this result in terms of the simulation of mental models.

Sherman, Cialdini, Schwartzman and Reynolds (1985) gave subjects a priming task involving imagining having the symptoms of a disease. One experimental group imagined "easy-to-imagine" (i.e., concrete) symptoms and the other experimental group imagined "difficult-to-imagine" (i.e., vague) symptoms. Control groups received the same narrative about the disease and read about easy/difficult-to-imagine symptoms. The easy versus difficult imaginability of symptoms affected later assessments of the experimental (imagining) groups as to their likelihood of contracting the disease. The easy vs. difficult imaginability of symptoms did not affect the assessments of the control groups.

Levi and Pryor (1987) asked subjects either to imagine a particular outcome of the Reagan/Mondale debate, to read a list of reasons for a Reagan (Mondale) win in this debate, to do both or to do neither. It was found that subsequent probability estimates of a Reagan (Mondale) win were affected only in the conditions where explanation of reasons for such a win was previously provided.

Anderson and Wright (1988) had auditor and student subjects assess the likelihoods of certain types of errors in an internal control system. They found that students who had earlier explained how such an error could occur gave higher likelihood assessments than did those who had not previously given such an explanation. A similar result was not observed for the auditor subjects, however.

The experiments on predictive reasoning have explored methods of activating representations of cause-effect relationships so as to make mental simulation of a specific chain of events easier relative to alternative sequences. Two techniques have been identified: 1) priming subjects by requiring them to explain how the outcome could have occurred;

2) priming subjects by requiring them to imagine how the outcome could have occured.

The empirical literature on mental simulation has not yet been extended into the area of evaluation of consequences of potential action, although the suggestion is often made that mental simulation is an effective process by which this activity might take place. Extension of the empirical research on mental simulation to this area is an additional contribution of this dissertation.

3.1.4 A method of testing for use of mental simulation of consequences in auditor judgment:

The proposed process of evaluating consequences of potential actions was portrayed in Figure 2. The chain of events that is simulated will depend on what is most readily accessible/constructable from memory given the action proposed. Jungermann and Thuring (1987, p. 255) suggest that the ease of memory retrieval of elements for use in a mental model will depend on "the strength of pre-activation of an element or the strength of ... association between elements."

The sequence of events whose strongly-connected representations in memory are pre-activated (e.g., through priming) should be easy to incorporate in a mental simulation when one is required.

In the absence of recent prior activation, the simulation utilized would depend solely upon the strength of the representation of contingency relationships between possible events following the proposed action. In this situation, it would be very difficult to infer what was simulated or whether simulation took place in the judgment process.

In order to discover whether simulation takes place in the judgment process, the researcher could make certain chains of events easy to simulate through prior recent activation (priming) of their representations and existing connection strengths between them. If, in formulating a response to a judgment task, an auditor utilizes mental simulation of a chain of events following from a proposed action, the previously-activated chain of events could be easily incorporated into this simulation. Thus, if the auditor uses mental simulation in a judgment task, priming of a chain of events leading to a particular consequence should influence his/her response in that judgment task (as compared to judgments resulting from unprimed events). In unprimed judgment, the chain of events simulated would be based solely upon learned connection strengths between event representations.

For example, consider an auditor who is deciding whether to take a particular action. Assume that the auditor is using a process of mental simulation to determine the possible consequences of carrying out this proposed action. If the auditor has in memory a pre-activated (primed) chain of events that through experience are strongly associated with each other and with this proposed action, then this chain of events is easily incorporated into the mental simulation. If this chain of events leads to a negative consequence, then the proposed action seems less desirable than it would in the absence of priming. Thus the propensity to carry through with the action should be lower in this case than it would be had the events leading to this negative outcome not been primed.

If simulation is not utilized in the judgment process then priming of a chain of events leading to a particular consequence should not influence the response in a judgment situation.

Influence of primed judgment in the direction suggested by primed consequences (relative to unprimed judgment) would provide evidence that simulation was utilized in the process.

3.1.5 Hypotheses:

In a non-auditing judgment situation it is expected that auditors and non-auditors would both have sufficient connection strengths between relevant event representations to perform mental simulation of consequences of proposed actions. Thus, priming of a particular consequence should influence the judgments of auditors and non-auditors in a similar fashion:

H1: Auditors' and non-auditors' responses to a non-audit judgment situation are affected by a chain of events made easy to simulate through priming.

In an audit judgment situation, auditors and non-auditors are not expected to behave in a similar manner due to their differing abilities to construct and simulate relevant mental models. This audit experience factor together with differences between auditors and non-auditors in technical accounting knowledge should cause auditors' responses to an audit judgment situation to differ from those of non-auditors.

H2: Auditors' and non-auditors' responses to an audit judgment situation are different.

Due to their experience in the audit environment, auditors have strong associative connections in memory representing the relationships between possible actions and ensuing chains of events. This has been learned through experience and through observation of others' experience. Thus, in an auditing judgment situation, auditors can draw upon this environment-specific knowledge to construct and simulate relevant mental models during the course of responding to the judgment situation. The priming of certain of these existing representations of events should influence the content of such simulation.

Non-auditors, on the other hand, lack repeated experience with contingency relationships between actions and outcomes and intimate knowledge of the incentive implications underlying possible outcomes. Jungermann, Schutz, and Thuring (1988, p. 153) conjecture that the non-expert does not have sufficient "simulation knowledge" with which to construct a mental model appropriate for understanding the effects of certain actions (the taking of pharmaceutical drugs in this case). Non-auditors, not having strong associations in memory between representations of the events following particular actions, would not have the tools to construct and simulate an appropriate mental model.

If this is the case, then priming of certain outcomes would not be expected to influence the responses of non-auditors in an audit judgment task.

H3: Auditors' responses to an audit judgment situation are affected by a chain of events made easy to simulate through priming. Non-auditors' responses to the same audit judgment situation are not affected in this way.

3.2 Reactions to outcomes of past actions:

3.2.1 Counterfactual simulation in reacting to outcomes of past actions:

The auditor's cognitions/emotions (e.g. regret, blame) upon experiencing or observing the consequences of past actions contributes to the body of experience upon which future judgments are based--i.e., this is the feedback element of judgment. Rumelhart et al. (1986, p. 46) express it this way: "...we are good at building models of our environment so that we can anticipate what the world would be like after some action or event takes place. As we gain experience with the world created by our (and others') actions we develop internal models of these external representations." Gibbins (1984, p. 116) suggests that the causal connections between actions and consequences are learned through experience.

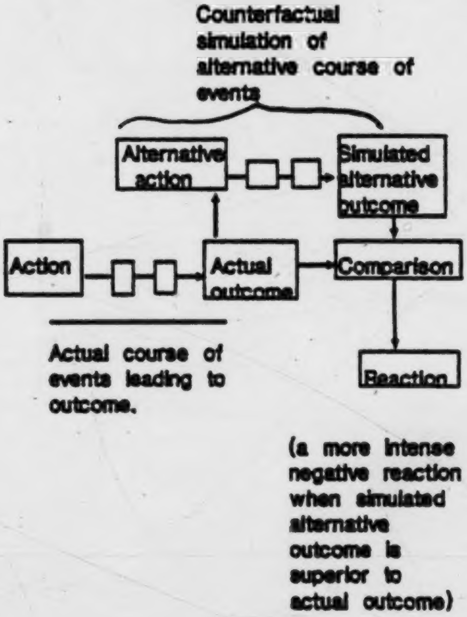
When individuals are evaluating potential consequences (process described earlier) they are anticipating how they (and possibly their peers) will feel about the occurrence of these consequences. These anticipated feelings may be drawn from recollections of reactions to past similar consequences of their own or others' actions. Thus each response to an outcome contributes to the learning process and to the body of experience upon which the auditor draws to help him/her mentally simulate not only the possible outcome but his/her and others' reactions to that outcome. This anticipated reaction, as shown earlier in Figure 2, should affect one's action choice.

Past research has provided evidence that mental simulation occurs spontaneously in assessing the way one feels about the occurrence of negative outcomes (but apparently not for positive outcomes[1]) (Gleicher, Kost, Baker, Strathman, Richman & Sherman, 1988). This is a different sort of simulation than that discussed earlier in relation to simulation of future consequences of potential actions in that it is a simulation of past events that could have happened but did not (counterfactual simulation).

Counterfactual reasoning involves reconstruction of the chain of events leading up to a past outcome by changing one or more events in that chain. Comparison of the outcome resulting from this simulated chain of events to the actual outcome can affect judgments and emotions.

As in the case of simulation of potential consequences, the mechanism by which the process may occur can also be described in terms of activation of units. Instead of potential future events, however, the sequence of pattern activation represents potential past events that did not occur. The proposed process is illustrated in Figure 3.

Figure 3: Counterfactual simulation in reacting to consequences of past action.


Counterfactual simulation of alternative course of events
Alternative action
Simulated alternative outcome
Action
Actual outcome
Comparison
Actual course of events leading to outcome.
Reaction
(a more intense negative reaction when simulated alternative outcome is superior to actual outcome)

Responses to outcomes are either reactions to consequences of one's own actions or reactions to consequences of the actions of other people. The one who took the action and experienced a negative outcome may experience such feelings as regret.

When observing the negative outcomes experienced by others, one might react with blame or criticism.

Alternatively one might empathize with an individual experiencing a negative outcome.

Blame/criticism is particularly relevant in the auditing profession because of the high value placed on reputation. Benston (1985) suggests that the commodity sold by public accountants is not only expertise but integrity. What makes integrity saleable is the investment in a reputation (p. 73). Outcomes that cause criticism or blame from the public may harm a firm's reputation. In addition to this, criticism or blame by one's peers is important in a self-disciplining profession.

The criticisms that one feels for the actions of one's professional peers will be encoded in memory with the associated actions and outcomes. This may form the basis for deriving expected criticism by others of one's own contemplated actions. The anticipated reaction of others may also enhance anticipated regret from a particular outcome.

3.2.2 Research supporting the proposed process:

3.2.2.1 Responding to consequences of one's own actions:

Prior research has suggested that regret (and other similar reactions) about consequences of one's own actions seems to involve the use of mental simulation. That is, past chains of events are altered in order to see how things might have turned out if only ... hadn't happened.

It has been suggested that the amount of regret experienced when an event has led to a negative consequence is related to the ease of imagining that changing that event would have led to a better consequence. Thus, easy imaginability of a scenario leading to a better outcome aids in the simulation of this scenario in judging one's feelings about the actual outcome. Difficult imaginability of such a scenario makes it difficult to simulate a better outcome.

Kahneman and Tversky (1982a) found that subjects tended to "undo" abnormal events rather than normal events leading up to a fatal car accident. Subjects had been asked to complete the sentence "If only ...." (In this and other similar studies, abnormality is operationalized as either behaviour that is different from past behaviour in the same situation or behaviour that is different than what others would do in the same situation.)

Wells, Taylor and Turtle (1987) varied the framing of three events as normal or exceptional. These events led up to an unfortunate outcome. It was found that there was a greater tendency for subjects to undo an exceptional version of the event (in an "if only ..." completion) than a normal version of the event.

There has been some evidence suggesting that it is easier to simulate a better outcome when an action has led to a negative outcome than when inaction has led to that same outcome. Kahneman and Miller (1986, p. 146) conjecture that "it is usually easier to imagine oneself abstaining from actions that one has carried out than carrying out actions that were not in fact performed."

Kahneman and Tversky (1982b) presented subjects with the following scenario:

> Paul owns shares in Company A. During the past year he considered switching to stock in Company B, but he decided against it. He now finds that he would have been better off by $1,200 if he had switched to the stock of Company B. George owned shares in Company B. During the past year he switched to stock in Company A. He now finds that he would have been better off by $1,200 if he had kept his stock in Company B. Who feels more regret?

Most subjects thought that George would feel more regret.

Landman (1987) found a similar effect. Subjects reading a scenario about an individual who had carried out an action leading to a negative outcome believed that this individual would have greater regret than an individual who had not carried out an action but where the same outcome occurred. Landman found that the effect for positive outcomes in parallel situations was not nearly as strong as for negative outcomes. This result suggests that simulation may be more likely to occur in response to a negative rather than a positive outcome. Landman suggests that this difference could be adaptive.

Gleicher, Kost, Baker, Strathman, Richman, and Sherman (1988) found greater affective reactions to a negative outcome following action than to this outcome following inaction. This result did not occur for positive consequences unless the counterfactual alternative outcome was made salient. The salience of the counterfactual alternative outcome did not affect results for negative outcomes. The authors suggest that "alternatives to reality are generated quite automatically and spontaneously in the case of negative outcomes..."(p. 17).

There have been several suggestions as to what underlies this action/inaction effect. Kahneman and Miller (1986) suggest that action seems more abnormal than inaction. Landman (1987, p. 526) hypothesizes that occurrences may be more salient than nonoccurrences. An alternative possibility suggested by Landman is that acts are perceived to be more informative than nonacts.

Overall, it appears that there is some evidence that ease of simulation of alternative better scenarios affects assessment of regret (or similar negative inward looking emotions). However, the studies providing this evidence all used a within-subjects' design. As can be observed from the above example (from Kahneman and Tversky, 1982b), it may not be difficult for subjects to guess the hypothesized result. These subjects could respond in such a way as to provide support for the hypothesis (experimental demand).

3.2.2.2 Responding to consequences of others' actions

It has also been suggested by some past research that feelings of blame or responsibility (i.e., an accusation that an individual is the cause of a negative event) may also be effected through a process of counterfactual simulation.

Wells and Gavanski (1989) asked subjects to assess cause for a death due to an allergic reaction from food ordered at a restaurant by another individual. All subjects were told of an alternative course of action that was considered. In one condition this alternative course of action would not have prevented the death. Subjects in this condition (relative to a condition in which the alternative action would have prevented the death) gave lower assessments of the causal role of the decision to order this particular dish. A similar effect was observed in a scenario involving a car accident of a paraplegic couple who had been refused a ride by a taxi driver.

It was found by Rennie (1987) that subjects tended to undo abnormal rather than normal events in assessing responsibility for a negative outcome. Subjects were given a scenario involving a lawsuit for negligence. The plaintiff had invested in a company on the basis of financial statements whose fairness had been attested to by the auditors. It turned out that the financial statements were incorrect due to a theft and fraud. Subjects were asked to assess the auditor's responsibility for the plaintiff's loss. Subjects who were told that the auditors had just this year changed to an inferior audit procedure assessed significantly greater responsibility for the loss than did subjects who were told that the auditors had always used this inferior procedure.

Although the result was interpreted in terms of abnormality/normality of the audit procedure, the constructs could be viewed as being operationalized as action versus inaction. That is, in the action (abnormal) condition, the auditor changed procedures and in the inaction (normal) condition, the auditor did not change procedures.

Other researchers have looked at reactions of sympathy rather than blame or criticism in response to a negative outcome. In a study involving a story about a victim shot in a store robbery, Miller and McFarland (1986) found that subjects awarded more compensation when the victim rarely shopped at the robbed store than when he regularly shopped there. In another scenario, subjects tended to award more compensation for an airplane crash victim who died one quarter of a mile from help than to one dying 75 miles from help. Apparently more sympathy for the victims occurred when it was easy to simulate an alternative course of events.

Overall, there is evidence that ease of simulating alternative scenarios affects reactions to the consequences of one's own actions and to the consequences of others' actions.

3.2.2.3 Other research:

In research unrelated to regret or blame/criticism for negative outcomes another variable has been found to affect perceived abnormality of an event. The variable is absolute frequency with which similar events are expected to occur (holding relative frequency constant). Miller, Turnbull, and McFarland (in press) found that a low frequency of similar ways an event could occur affects subjects' surprise about the event. They suggest that events that can be easily mentally replicated seem more normal than events that cannot be.

For example, subjects were more surprised about a breakdown of a rented car when told that 2 of 20 of the cars ever had problems than when told that 20 of 200 of the cars ever had problems. Because absolute frequency is suggested to be an indicator of perceived normality, a low frequency event may be easier to mentally undo than would an identical high frequency event in a mental simulation utilized to assess regret or criticism.

3.2.3 A method of testing for use of counterfactual mental simulation in reaction to outcomes of past actions:

Figure 3 illustrated the proposed process through which counterfactual simulation occurs to evaluate past consequences. That is, one is attempting to simulate how "things might have been" to provide a comparison to how "things actually turned out." The chain of events that is simulated will depend on what is most readily accessible/constructable from memory given the chain of events just experienced (i.e., the past action and consequence).

If a particular alternative chain of events is made easy to simulate, then this should affect the reaction to negative outcomes actually occurring (relative to situations in which an alternative chain of events is not made easy to simulate).

One chain of events that is available in memory is the one that has actually led up to the outcome to which the individual is reacting. The recent experience of the occurrence of that outcome would activate the mental representation of that chain of events. A cognitively efficient way of performing a simulation of an alternative course of events is to change one event in this chain.

Past research findings (discussed earlier) are consistent with the idea that actions in a past chain of events are easily changed to nonactions in a counterfactual simulation (Kahneman and Tversky, 1982a, p. 205 call this a downhill change). If this counterfactual simulation (with the action removed) results in a better outcome, negative feelings about the actual outcome are increased. It has been found that it is more difficult to simulate an alternative course of events by adding an action (Kahneman and

Tversky, 1982a, p. 205 call this an uphill change).

If counterfactual mental simulation is utilized in responding to a particular consequence then the presence of an action in the actual chain of events should produce a more negative reaction relative to a chain of events not containing this action. If simulation is not used in assessing one's response to a consequence, then there would be no effect of an action versus inaction in the chain of events.

H4: The reaction to a negative outcome is affected by the presence of an action in the chain of events leading up to that outcome.

As discussed earlier, a factor that seems to affect perceived abnormality is absolute frequency of ways the same type of event could occur. Thus low absolute frequency (holding relative frequency constant) suggests a more abnormal event. If such an event is part of a chain of events leading to a negative outcome it may be easier to change in a counterfactual simulation than would be an event which could occur in a higher number of similar ways.

If simulation is used to assess the response to a negative outcome, then such a reaction could be influenced by the presence of an event for which there is a low frequency of potential occurrences of similar events. If simulation is not used in assessing one's response to a consequence then there would be no effect of variation in absolute frequency.

H5: The reaction to a negative outcome is affected by the presence of a prior event for which the frequency of other similar events is very low.

Although the events actually experienced prior to a negative outcome may be easy to utilize (with a simple change) in a counterfactual simulation, there may also be other possible events to simulate. For example, if a chain of events were made available through priming then these events may be used in a counterfactual mental simulation. If this primed chain of events also leads to a negative outcome, then a negative reaction would be suppressed relative to situations in which this chain of events is not made available through priming. Gleicher, Kost, Baker, Strathman, Richman and Sherman (1988, p. 20) suggest that negative emotion may be blunted if alternative scenarios result in the same outcome as the outcome that actually occurred.

H6: The reaction to a negative outcome is affected by a chain of events made easy to simulate through priming.

Another possible scenario available for simulation can occur if an individual had recently proposed or discussed a different action choice than the one made. The course of events likely to follow this alternative choice could form the basis for a counterfactual simulation.

3.3 Summary:

In this chapter, an attempt has been made to develop a conceptual framework from which to view the thought process surrounding consequence assessment--both for possible outcomes of potential actions and for outcomes of past actions. Ideas from several disciplines were collected in order to develop a coherent framework about the role of mental simulation in outcome evaluation. Hypotheses derived therefrom should be testable using methods previously found to be successful in other settings, provided that subjects are attentive and engaged by the experimental situation, that the manipulations have impact upon them (experimental realism) and that experimental demand does not occur. In the study, efforts were made to ensure that these conditions existed and tests were done to detect their absence/presence.

Figure 4 illustrates the proposed process in its entirety. Table 1 summarizes the hypotheses derived therefrom.

Figure 4: Conceptual framework of consequence evaluation.

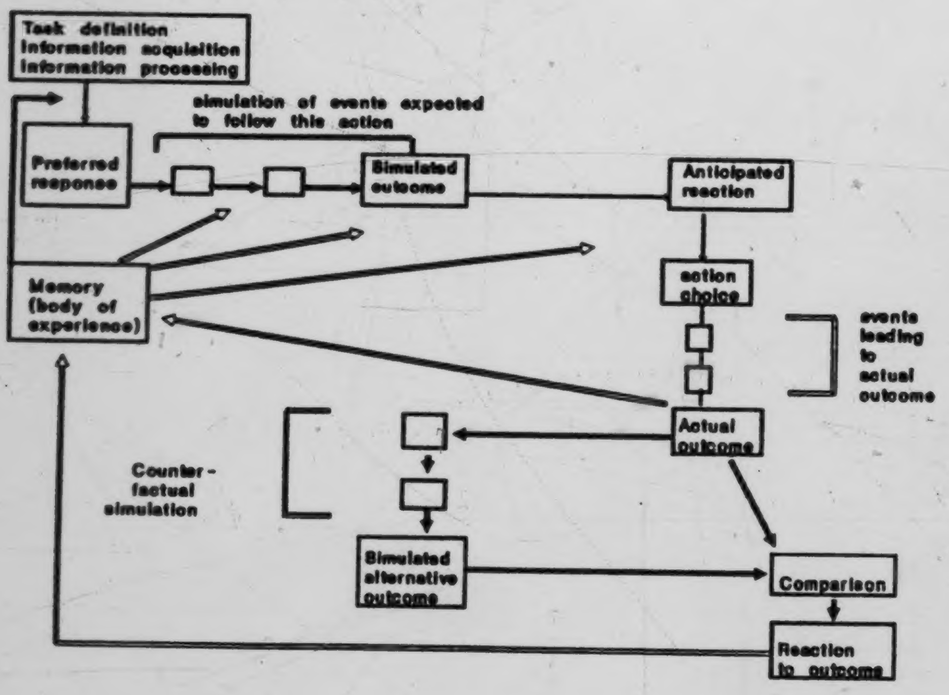


Table 1: Summary of Hypotheses

Simulation of possible outcomes of potential actions:

H1: Auditors' and non-auditors' responses to a non-audit judgment situation are affected by a chain of events made easy to simulate through priming.

H2: Auditors' and non-auditors' responses to an audit judgment situation are different.

H3: Auditors' responses to an audit judgment situation are affected by a chain of events made easy to simulate through priming. Non-auditors' responses to the same audit judgment situation are not affected in this way.

Counterfactual simulation in reacting to past outcomes:

H4: The reaction to a negative outcome is affected by the presence of an action in the chain of events leading up to that outcome.

H5: The reaction to a negative outcome is affected by the presence of a prior event for which the frequency of other similar events is very low.

H6: The reaction to a negative outcome is affected by a chain of events made easy to simulate through priming.

CHAPTER 4

METHOD

4.1 Overview of the experiments:

Two experiments were carried out in order to test the hypotheses discussed in the last chapter. There were two types of participants in the experiments--auditors and students. Each subject participated in only one of the experiments.

The auditors were 84 managers[2] from six national accounting firms. Managers were chosen because they have considerable experience through which to develop knowledge about the incentive structure in the audit environment and the contingency relationships among potential events in this environment.

Managers from Toronto and Edmonton did the experiments in a total of ten sessions with one to fourteen managers participating in each session. The same set of instructions was read at the beginning of each session and subjects were debriefed at the end of each session. Neither the session in which the subjects participated nor the firm to which they belonged had an effect on results.

Also participating in the study were 114 intermediate accounting students from the University of Alberta. Intermediate accounting students were chosen as a "novice" group against which to compare the auditors.

In terms of the hypotheses presented in chapter 3, these students were the non-auditors. It was important that the non-auditors in the experiment have sufficient technical accounting knowledge to be able to respond to the audit judgment task and yet not have experience in the audit environment. Intermediate accounting students best met these qualifications.

Of the data from the student participants, those of 84 students were utilized in the experiments so as to attain equal cell sizes. (The method of dropping subjects is discussed later; most were dropped due to incomplete response sets.)

The students did the experiments in four sessions in numbers ranging from 26 to 34. The same set of instructions was read at the beginning of each session and subjects were debriefed at the end of each session. The session in which the students participated did not affect the results.

In experiment 1 a non-audit judgment task was utilized. In experiment 2, an audit judgment task was employed. An overview of the experiments is presented in Table 2.

Table 2: Overview of the Experiments.

		Experiment 1	Experiment 2
Type of judgment situation:		Non-audit	Audit
Subjects:	Auditors	24	60
	Students	24	60
Design:	Part 1	2 X 2	2 X 5
	Part 2	2 X 2 X 2	2 X 5 X 2 X 2
Hypotheses addressed:			
	Part 1	H1	H2 & H3
	Part 2	H4 & H6	H4, H5 & H6

4.2 Pilot testing:

In the first pilot test, four audit managers from the Edmonton Office of a national accounting firm and four non-auditors did the audit judgment experiment. They then made comments about the understandability and reasonableness of the materials. The time taken to do each section of the experiment was noted.

Revisions were made to the instruments based on what was learned from this pilot test. In particular, the wording of questions and the order of some questions was changed in accordance with the comments received. In addition, it was observed that a number of pilot-test subjects gave responses close to the lower end of the response scale in the judgment task.

The task was changed slightly in order to move the mean response closer to the centre of the scale so that a priming effect, if present, would not be obscured by the crowding of responses at one end of the scale. Then the revised judgment task was sent back to the auditor pilot-test subjects. The change to the task did have the desired effect of increasing their mean response.

A second pilot test was carried out in which test subjects did the experiment (either the audit situation or the non-audit situation) as revised. Again these subjects made comments on the understandability and reasonableness of the materials and on the time required. This test involved three audit managers from another national firm and two non-auditors. Revisions to the wording of questions were made based on these comments.

It was observed that some pilot-test subjects believed that their responses may have been influenced by a well-publicized corporate failure involving a public inquiry at which auditors from several firms had to testify.[3] It was believed that these events may have had the effect of "priming" the auditor subjects for the outcome of litigation. This factor and the fact that there were not enough audit managers available in Edmonton for the sample size required led to the decision to use Toronto audit managers for the experiment involving the audit judgment situation.

4.3 Experiment 1: Non-audit judgment situation:

4.3.1 Overview:

This experiment centred around a non-auditing situation--a gamble framed as an investment decision. The experiment is best described in two parts.

4.3.1.1 Part 1: Test of simulation of outcomes of potential actions:

After reading a narrative about the Vancouver stock exchange, half of the subjects were primed by being required to explain the process by which one might suffer a catastrophic loss. This priming variable (PRIME) along with the auditor vs. non-auditor variable (EXPNOV) were the two independent variables in this part of the experiment. After being presented with the investment judgment situation (an opportunity to become a partner in a business), subjects gave the likelihood that the individual would become a partner. The response to this question is the dependent variable for part 1 of the experiment (INVEST). They were also asked to say what they would do in the situation. The variables and the relevant hypothesis and prediction are presented below in Table 3.

Table 3: Experiment 1; Part 1: Variables, Hypotheses, Predictions.

Variables:

Dependent variable:

INVEST: Likelihood that the individual will become a partner in the business.

Independent variables:

EXPNOV: Auditors vs. students

PRIME: 1. Primed - Subjects explain process by which one could suffer a catastophic loss trading on the Vancouver Stock Exchange.

2. No prime.

Hypothesis	*Prediction*
H1: Auditors' and non-auditors' responses to a non-audit judgment situation are affected by a chain of events made easy to simulate through priming.	Mean likelihood assessment lower in primed condition than in unprimed condition for both auditors and students.

4.3.1.2 Part 2: Test of counterfactual simulation in reacting to outcomes:

After finding out the decision that was made by this person (to become a partner) and the negative consequence (failure of the business), subjects were asked to assess the individual's regret and the level of criticism by others. These were the dependent variables for part 2 (called REGRET and CRITICISM respectively).

An additional independent variable was manipulated at this stage. It was an action versus inaction variable as described in chapter 3. Subjects in one condition received information that the individual originally decided not to become a partner but then changed his/her decision. In the other condition this action (change of decision) was not mentioned. The variable is called ACT. The variables for this part of the experiment and the hypotheses and predictions pertaining to them are presented below in Table 4:

Table 4: Experiment 1; Part 2: Variables, Hypotheses, Predictions

Variables:

Dependent variables:

REGRET: Assessment of regret as a result of finding out that the individual decided to become a partner in the business and the business failed.

CRITICISM: Assessment of criticism by others upon finding out that the individual decided to become a partner in the business and the business failed.

Independent variables:

EXPNOV: as in Table 3

PRIME: as in Table 3

ACT: 1. Subjects are told that the individual had at first decided not to become a partner in a business but changed this decision.
2. Subjects are told that individual decided to become a partner in a business--no prior decision was mentioned.

Hypotheses	*Predictions*
H4: The reaction to a negative outcome is affected by the presence of an action in the chain of events leading up to that outcome.	Mean regret/criticism higher in action condition than in inaction condition.
H6: The reaction to a negative outcome is affected by a chain of events made easy to simulate through priming.	Mean regret/criticism lower in primed condition than in unprimed condition.

In addition to the predictions described in Table 4 there is another potential result that was discussed in the last chapter. Assessments of regret and criticism may be related to the course of action previously suggested by the subject in part 1 of the experiment. Such a relationship could be due to the ease of simulation of the action that was suggested by the subject if it was different than the one taken. Thus, a negative correlation between INVEST and REGRET and between INVEST and CRITICISM may be observed. In addition, response to the question "What would you do in this situation?" may be associated with REGRET and CRITICISM, with assessed regret and criticism being higher for people who said they would not have become a partner in the business.

4.3.2 Method:

4.3.2.1 Subjects:

The subjects in the experiment were 24 auditors and 30 intermediate accounting students. The subjects were randomly assigned to conditions.

The auditors were managers from five national accounting firms (Toronto and Edmonton offices). On average they had been Chartered Accountants for 4.5

years, had 6.2 years of audit experience and 2.2 years of experience as a manager.

The students were intermediate accounting students from the University of Alberta. In order to equalize cell sizes, the data of six of the students were not included in the analysis. Three of these students were dropped randomly from the analysis. Two others may have guessed that they had been primed as suggested by their answers to manipulation checks. The sixth student did not answer the question that was to prime him/her and also did not respond to other important questions.

Of the 24 students whose data were used, 12 were accounting majors. The mean year that these students were at in their programmes was 3.2.

4.3.2.2 Design:

Part 1 of the experiment was a 2 X 2 design with independent variables EXPNOV and PRIME varied at two levels each (Table 5).

Table 5: Experiment 1; Part 1: Design.

	Auditors	Students	
Primed	12	12	24
Unprimed	12	12	24
	24	24	48

In part 2 of the experiment a third independent variable was added (ACT) resulting in a 2 X 2 X 2 design for this part (Table 6).

Table 6: Experiment 1; Part 2: Design.

	Auditors		Students		
	Primed	Unprimed	Primed	Unprimed	
Action	6	6	6	6	24
Inaction	6	6	6	6	24
	12	12	12	12	48

4.3.2.3 Procedure and materials: (see Appendix F for an example of the instrument)

Subjects were first read instructions for the experiment. They were reminded that their participation was voluntary, that they were guaranteed anomymity, and that they could withdraw from the study at any time.

The tasks were given to the subjects in separate envelopes which were sealed upon completion and re-insertion of the materials therefrom. The first task (priming task) involved a narrative about the Vancouver Stock Exchange (utilizing information obtained from Keane (1981) and Ross (1984)). A different variation of the task was used for each of two conditions of the priming manipulation.

In the first condition, the narrative included the following statement: "However, the potential for suffering losses when trading on this exchange is well known." Then one of the subsequent questions asked for an explanation of the process by which an investor might suffer a catastrophic loss. The second condition contained neither of these elements.

They then went on do to a filler task, which involved a narrative describing an internal control system. (For more information and related results, see the section on Checks of manipulations and maintained hypothesis and also Appendix A.) The purpose of the filler task was to ensure that subjects did not consciously realize that they were being primed. Because of the similarity between the events involved in the priming task and those in the subsequent judgment task, the unrelated filler task was used to avoid the possibility that subjects would consciously make that connection.

If subjects had guessed the purpose of the experiment they may have attempted to help achieve (or hinder) the desired results (experimental demand). With the exception of the two students discussed earlier (and dropped from the analysis) no one realized that s/he had been primed.

The subjects then went on to the next task (from a separate envelope) involving the non-audit judgment situation. The judgment task involved an individual who had a chance to become a partner in a business that intended to produce and market an innovative new product. To raise enough money, this person would have to use his/her life savings and take out a personal loan. Subjects were asked to assess the likelihood (on a 0 to 8 scale) that the individual in the situation would decide to become a partner in the business.

In the next part of the experiment, subjects were given (in a new envelope) information that the individual had decided to become a partner in the business but the business turned out to be unsuccessful. In the first condition of the variable ACT the individual had originally decided not to invest but later changed that decision. In the second condition there is no change of decision.

Subjects were asked to assess the level of regret (0 to 8 scale) felt by the individual. They were then asked to assess the amount of criticism by others that would occur (0 to 8 scale).

After the experiment was over, subjects were debriefed. They were informed of the objectives of the research and that they could withdraw their data if they wished to do so.

4.3.2.4 Checks of manipulations and maintained hypothesis

4.3.2.4.1 Checks of manipulations:

Several questions were designed to provide information about subjects' interpretation of and attention paid to manipulated items and also to provide information about the constructs being tested through manipulation of the variables. This section is organized by the independent variable to which the questions relate.

EXPNOV:

1. Students were asked whether they had prior experience working in a Chartered Accounting firm as it had been assumed that the students did not have prior experience.
2. Information was collected on auditors' amount of experience and the students' major area, year in the programme and future plans to aid in interpretation of results.

PRIME:

1. Subjects were, near the end of the experiment, asked to recall whether the narrative that they had read mentioned the potential for suffering losses when trading on the Vancouver Stock Exchange. A correct response to this question would provide evidence that the subjects attended to the manipulated information.
2. As part of the priming process, some subjects were

asked to explain the process by which one could suffer a catastrophic loss trading on the Vancouver stock exchange. If subjects did not answer this question in accordance with the instructions, the possibility of finding a difference between primed and unprimed conditions would be reduced.

3. Two questions were asked to determine whether subjects realized that they were being primed, the second of these being more direct than the first. The validity of the priming manipulation would be lost if subjects were to guess that the priming task was meant to influence their responses in the judgment task (experimental demand).

4. Subjects were asked whether the simulation of mental models (as described to them) may aid them in choosing an appropriate action in response to a judgment situation such as the one that they had dealt with earlier. Although such self-report information should be interpreted carefully, it could provide an indication as to whether the hypothesized process being tested through the manipulation of the priming variable is thought to be used.

ACT:

1. Subjects were asked in a multiple-choice question to recognize the prior decision (if any) taken by the

individual in the situation before changing his/her mind (if s/he did so). A correct answer to this question would provide evidence that the subjects attended to the manipulated information.

2. Subjects were asked to assess how unusual the individual's decision to become a partner in the business was (0 (not at all unusual) to 8 (extremely unusual)). The purpose of the question was to reveal the subject's view of the normality or abnormality of the individual's behaviour. The response to this question would provide evidence as to whether abnormality of the behaviour was what underlay the hypothesized effect on the regret and criticism assessments.

3. Subjects were asked to give the probability that another individual in the situation would have decided to become a partner in the business. The response to this question may provide some evidence as to whether the hypothesized effect of ACT on regret/criticism assessments was mediated by assessments of the probability of that action.

4.3.2.4.2 Checks of maintained hypothesis:

The purpose of this dissertation was to discover whether auditors use simulation of mental models in outcome evaluation. A maintained (i.e., assumed) hypothesis is that it is possible for people to construct mental models at all. Two questions in the study addressed this issue.

Subjects were asked if they use mental simulation (as described in the question) in their judgments and were asked to give an example. The response to this question would give an indication as to whether the subjects themselves believe that they can construct and simulate mental models.

In another part of the instrument, subjects were asked to recall as much as they could from a detailed internal control narrative that they had read earlier. Because of their experience at dealing with internal control systems, auditors should be able to immediately construct a mental model of a system described in narrative form - that is, if people are capable of constructing models. (Waller and Felix (1984b) conjectured that auditors utilize mental models of internal control systems.)

It was expected that if auditors utilized mental models of this internal control system their later recall of the information would be much better than that of the students. It was also expected that auditors would likely reinstate the natural order of events in their recall (The order of some events was intentionally reversed in the narrative).

Because the results of this procedure are interesting in themselves, a description of this aspect of the study is given in Appendix A.

4.4 Experiment 2: Audit judgment situation:

4.4.1 Overview:

This experiment centred around an auditing situation. The experiment is best described in two parts.

4.4.1.1 Part 1: Test of simulation of outcomes of potential actions

- The judgment task in this experiment was about an audit manager who was faced with a decision as to whether or not to concur with a client's proposed accounting treatment of an inducement received for agreeing to become a tenant in a particular building. (The client had recognized the entire inducement in the current year rather than using a more conservative approach.) The subjects assessed the likelihood that the audit manager would concur with the client's accounting treatment. This dependent variable was called CONCUR.

Before doing this judgment task subjects were primed in the following way:

First, they read a narrative about the audit profession.

and then answered questions about the narrative. Two different kinds of consequences were primed, each in two different ways. There was also an unprimed condition. The two outcomes primed were litigation and loss of client. For each of these consequences subjects either were exposed to this outcome in the narrative or they were exposed to it and also asked to explain the process by which such an outcome could occur. This priming variable (PRIME) and the auditor versus student variable (EXPNOV) were the only two independent variables manipulated in part 1 of the experiment. The variables, hypotheses and predictions related to this part of the experiment are presented in Table 7.

Table 7: Experiment 2; Part 1: Variables, Hypotheses and Predictions.

Variables:

Dependent variable:

CONCUR: Assessment of the likelihood that the auditor will concur with the client's accounting treatment.

Independent variables:

EXPNOV: Auditors vs. students

PRIME:
1. Litigation explanation: The subject gives an explanation of the process by which an auditor could find himself/herself in a litigation situation. This is done after reading a narrative mentioning the litigation outcome.
2. Litigation exposure: The subject is exposed to the litigation outcome by seeing it mentioned in a narrative.
3. No prime: Subjects read a narrative but no particular negative outcome is mentioned.
4. Loss of client exposure: The subject is exposed to the loss of client outcome by seeing it mentioned in a narrative.
5. Loss of client explanation: The subject gives an explanation of the process by which an auditor could find himself/herself in a client loss situation. This is done after reading a narrative mentioning the client loss outcome.

Hypotheses	*Predictions*
H2: Auditors' and non-auditors' responses to an audit judgment situation will differ.	Different mean likelihood of concurrence for auditors & students
3: Auditors' responses to an audit judgment situation are affected by a chain of events made easy to simulate through priming. Non-auditors' responses to the same audit judgment situation are not affected in this way.	For auditors, a linear trend for PRIME with the lowest mean likelihood of concurrence in condition 1 and the highest in condition 5. No such trend for the students. (linear by linear interaction for PRIME and EXPNOV)

The reason for using two types of priming was to try to provide further support that it was simulation that was affecting responses and not simply salience of the outcome. More support for the case of simulation would result if priming conditions making the chain of events leading to an outcome easy to imagine resulted in more extreme subject responses to the judgment task than priming conditions that made the outcome salient but not as easily imaginable.

In the explanation conditions the subject is made to activate cause-effect relationships leading to the consequence by describing the events leading up to that consequence. In the exposure conditions the consequence is made salient through reading about it in a narrative.

If explanation affects responses to the judgment task but exposure to the outcome does not, the responses in the exposure conditions would not be different than those in the unprimed condition. The responses to the judgment task by those in the litigation explanation condition would be lower (because the consequence of litigation simulated from the proposed action of concurrence would make one less likely to carry through with the action). The responses to the judgment task by those in the loss-of-client explanation condition would be higher (because simulation of loss of client due to non-concurrence would make one more likely to concur). This suggests a linear trend from conditions 1 to 5 (Table 7).

If salience alone (rather than simulation) of the outcome affects likelihood assessments then there would be no difference between the exposure and explanation conditions for any given outcome and both would differ from assessments of subjects in the unprimed condition.[4] (This is also a linear trend but comparisons of means would suggest whether the situation described had occurred.)

Intermediate accounting students were not expected to be affected by the priming task. Lacking connections between the representations of these events, the student would not have the tools to construct/simulate a relevant mental model.[5]

4.4.1.2 Part 2: Test of counterfactual simulation in reacting to outcomes:

In part 2 of the experiment, after finding out the decision made by the audit manager (to concur) and the negative consequence (lawsuit), subjects were asked to assess the auditor's regret (REGRET) and the level of criticism (CRITICISM) by others. Two more independent variables were added at this stage.

An action vs. inaction variable was manipulated (ACT). The subjects in one condition received information that the auditor had originally taken the position that the inducement should be recognized over the term of the lease rather than in the current year as was the client's preference. The auditor then changed his/her position (the action) deciding to concur with the client's recognition of the inducement in the current year. In the other (inaction) condition subjects were told that the auditor decided to concur with the client's recognition of the inducement in the current year.

The other independent variable manipulated at this stage was the absolute frequency with which it was suggested that other auditors would have also taken the entire inducement into current income (FREQ). In one condition subjects were told that 1 of 10 auditors questioned would have taken the inducement into current income (low frequency) and in the other condition 10 of 100 auditors would have done this.[6]

A summary of these variables and the related hypotheses and predictions are presented in Table 8.

Table 8: Experiment 2; Part 2: Variables, Hypotheses, Predictions.

Variables:

Dependent Variables:

REGRET: Assessment of regret of the audit manager due to the lawsuit.

CRITICISM: Assessment of amount of criticism by others as a result of the lawsuit.

Independent Variables:

EXPNOV: as in table 7

PRIME: as in table 7

ACT:
1. Auditor changes position on the accounting treatment (action).
2. No mention is made of the auditor having previously taken a different position (inaction).

FREQ:
1. The investor suing the auditors found that 1 of 10 auditors questioned would have favoured the client's accounting treatment (low frequency).
2. The investor suing the auditors found that 10 of 100 auditors questioned would have favoured the client's accounting treatment (high frequency).

Hypotheses	*Predictions*
H4: The reaction to a negative outcome is affected by the presence of an action in the chain of events leading up to that outcome.	Mean regret/ criticism higher in the action condition than in the inaction condition.
H5: The reaction to a negative outcome is affected by presence of a prior event for which the frequency of other similar events is very low	Mean regret/ criticism higher in the low frequency condition than in the high frequency condition.
H6: The reaction to a negative outcome is affected by a chain of events made easy to simulate through priming.	Mean regret/ criticism lower in explanation conditions of PRIME than in others.

In addition to the predictions described in Table 8 there is another potential result in part 2 of the experiment that was discussed in the last chapter. Assessments of regret and criticism could be related to the course of action previously suggested by the subject in part 1 of the experiment. This would be due to the ease of simulation of the action that was suggested by the subject if it was different than the one taken. Thus a negative correlation between CONCUR and REGRET and between CONCUR and CRITICISM could be observed. In addition, response to the question "What course of action do you recommend in this situation?" could be associated with REGRET and CRITICISM with assessed regret and criticism being higher for people who recomended a more conservative action than the audit manager eventually took.

4.4.2 Method:

4.4.2.1 Subjects:

The subjects in the experiment were auditors and students. The auditors were 60 managers[2] from the Toronto offices of five national accounting firms. On average they had been chartered accountants for 4.4 years, had 6.6 years of auditing experience and 2.3 years of experience as a manager.

The students were 84 intermediate accounting students from the University of Alberta. In order to equalize cell sizes the data of only 60 students were used in the analysis. The following criteria were used to determine which subjects to drop:

1.	Incomplete data sets (priming question not attempted (10); dependent variable missing (2); post audit events question not attempted (3))	15
2.	Incorrect answer to manipulation check for recognition of primed information. (Normally this would not be considered grounds for dropping subjects but in this case there were significantly more student errors than there were auditor errors in this question.)	3
3.	Student said he didn't know what litigation was.	1
4.	Randomly dropped	5
		24

Of the 60 remaining student subjects 38 were accounting majors. The mean year that they were at in their programmes was 3.3.

4.4.2.2 Design:

In part 1, the experiment was a 2 X 5 design with two independent variables EXPNOV and PRIME varied between subjects (Table 9).

Table 9: Experiment 2; Part 1: Design

		Auditors	Students	
PRIME	1. Litigation explanation	12	12	24
	2. Litigation exposure	12	12	24
	3. No prime	12	12	24
	4. Loss of client exposure	12	12	24
	5. Loss of client explanation	12	12	24
		60	60	120

In part 2 (counterfactual simulation) the expermental design was 2 X 5 X 2 X 2. The four independent variables were EXPNOV, PRIME, ACT and FREQ all varied between subjects (Table 10). It should be noted that the minimum cell size in the analysis was 6 because the 4-way interaction was not analysed.

Table 10: Experiment 2; Part 2: Design

	Auditors PRIME						Students PRIME						
	1	2	3	4	5	total	1	2	3	4	5	total	
Action													
Low freq	3	3	3	3	3	15	3	3	3	3	3	15	30
High freq	3	3	3	3	3	15	3	3	3	3	3	15	30
	6	6	6	6	6	30	6	6	6	6	6	30	60
Inaction													
Low freq	3	3	3	3	3	15	3	3	3	3	3	15	30
High freq	3	3	3	3	3	15	3	3	3	3	3	15	30
	6	6	6	6	6	30	6	6	6	6	6	30	60
	12	12	12	12	12	60	12	12	12	12	12	60	120

4.4.2.3 Procedure and materials: (See Appendix G for an example of the intrument.)

Prior to beginning the expertment, subjects were read instructions. They were reminded that their participation was voluntary, that they could withdraw at any time, and that their anonymity was guaranteed. The tasks were given to the subjects in separate envelopes which were sealed upon completion and re-insertion of the materials therefrom.

The first task (priming task) involved a narrative about the evolution of the accounting profession (derived in part from Mednick and Previts, 1987) followed by questions about the narrative. A different variation of the priming task was used in each of five conditions of the priming variable:

1. Litigation explanation condition: The problem of litigation against auditors was mentioned in the narrative. One of the questions asked for an explanation of the process by which an auditor might find himself/herself involved in a litigation situation.

2. Litigation exposure condition: The problem of litigation against auditors is mentioned in the narrative.

3. Unprimed condition: There is no mention of any

specific potential consequence.

4. Client loss exposure condition: The problem of potential loss of client is mentioned in the narrative.

5. Client loss explanation condition: The problem of potential loss of client is mentioned in the narrative. One of the questions asks for an explanation of the process by which an auditor might find himself/herself involved in a client loss situation due to a disagreement with the client.

A filler task was then carried out (between the priming task and the judgment task). It involved a narrative about an internal control system (for more information about this task see the section on checks of manipulations and maintained hypothesis and also Appendix A). The purpose of the filler task was to ensure that subjects did not consciously recognize the connection between the priming task and the judgment task and guess the hypothesis (experimental demand). If subjects guess the hypothesis they may respond to questions in such a way that the hypothesized result is achieved (or perhaps not achieved). Responses to subsequent questions asked of subjects indicated that none had recognized that the priming task was meant to influence later responses.

Subjects then went on to the next task involving the audit judgment situation. The audit judgment task was adapted from a study by Gibbins and Mason (1988). It involved an audit manager in a situation where the client's recognition of certain revenue was somewhat non-conservative. That is, the client received an inducement (in two installments) from the landlord of a building to encourage the client to move into that building. The client recognized the entire inducement in current year's income. The audit manager was deciding whether to concur with this accounting treatment of the inducement.

Subjects were asked to assess the likelihood (on a 0 to 8 scale) that the audit manager in this situation will concur with the client's accounting treatment. They then answered the question "What course of action do you recommend in this situation?" (The answer was in multiple choice form with a category for other courses of action.)

This particular task was chosen because it was observed that in the Gibbins and Mason study, auditors did not have a consensus on the correct method of treating the inducement (about 28% would recognize in current year, 50% would recognize over the term of the lease and 22% would use a different accounting method). Furthermore, any of several methods of accounting for this event (including the all current method used by the client in this judgment task) can be justified on rational grounds. Thus, even if a subject was influenced by the priming task he/she could still rationalize his/her answer in a reasonable way. The possibility of the occurrence of experimental demand due to the subject's desire to look good by being ultra-conservative is minimized because both conservative and non-conservative responses can be justified on rational grounds.

The task in part 2 of the experiment describes what happens to the audit manager after concurring with the client on this accounting issue. The client subsequently goes bankrupt and an investor sues the auditors. Two independent variables are manipulated in this task:

I. Action/inaction variable:

1) Action condition: The auditor's initial preference was to require a more conservative accounting procedure but changed his/her position after meeting with the client.

2) Inaction condition: The auditor decided to concur with the client's accounting treatment after meeting with the client. No mention is made of an initial preference.

II. Frequency variable:

1)Low frequency: The investor that is suing the auditors found that out of 10 auditors questioned, 1 would recommend the same accounting treatment as was used by the client.

2)High frequency: The investor that is suing the auditors found that out of 100 auditors questioned, 10 would recommend the same accounting treatment as was used by the client.

Subjects were asked to assess the level of regret (0: no regret to 8: extreme regret) felt by the auditor as a result. Then they were asked to assess the extent to which the auditor would be criticized by others (0: not at all to 8: severely).

It should be noted that information given to subjects in the frequency manipulation suggested that only 10% of auditors would use the current recognition method whereas in reality the proportion is closer to 30% (as found in Gibbins and Mason, 1988). Subjects were provided with this information after the experiment (during debriefing).

After the experiment subjects were debriefed. They were informed of the objectives of the research and that they could withdraw their data if they wished to do so.

4.4.2.4 Checks of manipulations and maintained hypothesis

4.4.2.4.1 Checks of manipulations

As in experiment 1, several questions were designed to provide information about subjects' interpretation of and attention paid to manipulated items and also to provide information about the constructs being tested through manipulation of the variables.

EXPNOV:

1. Subjects were asked to list five potential events that they felt could occur after a typical audit, the importance of each and its likelihood. This question had been asked of auditors in a prior study by Gibbins and Wolf (1982). The question was considered particularly useful in this setting because the responses should provide information about the assumed differences between university students and auditors as to prior knowledge about outcomes.

2. Students were asked whether they had had prior experience working in a Chartered Accounting firm as it had been assumed that the students did not have prior experience.

3. Information was collected on the auditors' level of experience and on the students' major areas, year in the programme and future plans (CA, CGA, or CMA) to aid

in interpretation of results.

PRIME:

1. Subjects were given a multiple choice question requiring them to recognize the information that they were primed with. A correct response to this question would provide evidence that the subjects attended to the manipulated information.

2. The answers given by subjects in the explanation conditions provided additional information which could be used to assess the impact of the priming manipulation. If subjects did not respond according to the instructions the likelihood of an effect by the priming variable would be reduced.

3. The responses to the post-audit event question (described under EXPNOV) were expected to reveal indirectly whether the priming information had been attended to. That is, the events mentioned and the likelihood and importance ratings could be affected by the way that the subject was primed. Such an effect would provide additional evidence that the priming information was attended to.

4. Subjects were asked after assessing regret and criticism of the auditor to give the probability that a randomly chosen auditor would have concurred with the client. Extreme answers to this question might suggest

that the subject has very strong views on the accounting issue dealt with in the judgment situation, reducing the probability of his/her responses being influenced by the priming manipulation.

5. In a later question subjects were asked to give their opinion as to the proportion of auditors that would recommend the accounting treatment that was used by the client. As with the probability question, it was thought that extreme answers may suggest strong views on the issue that are not easily manipulated through priming.

6. Two questions were aimed at determining whether subjects realized that they were being primed, the second of these being more direct than the first. The validity of the manipulation would be lost if subjects were to guess that the priming task was meant to influence their responses in the judgment task (experimental demand).

7. Students were asked to indicate any parts of the experiment that made them think about the consequences of judgments made by auditors. This question was intended to reveal whether priming (particulary in the explanation condition) had the effect of teaching the students the relevant contingency relationships. This possibility was discussed in footnote 5.

8. Subjects were asked if simulation of mental models (as described to them) may aid them in choosing an appropriate action in response to a judgment situation such as the one that they had dealt with earlier. The responses show whether the subects believe that the hypothesized process being tested through manipulation of the priming variable is used.

ACT:

1. Subjects were, in a multiple choice question, required to recognize the prior position (if any) taken by the auditor. A correct answer to this question would provide evidence that the subjects attended to the manipulated information.

2. The subjects were also asked to assess how unusual the auditor's decision to concur was. The purpose of this question was to assess the subject's view of the normality/abnormality of the auditor's behaviour. The response to this question provides evidence as to whether abnormality of the behaviour is what underlies the hypothesized effect on regret and criticism assessments.

3. Subjects were asked to give the probability that a randomly chosen auditor would have concurred with the client. The responses to this question provide evidence as to whether the hypothesized effect on the

regret/criticism assessments by the ACT manipulation was mediated by the subjective probability of concurrence.

FREQ:

1. Subjects were asked to recall the proportion of auditors questioned that would recommend the accounting treatment used by the client. The answer to this question provided evidence as to whether this information was attended to.

2. Subjects were asked their own opinion of the proportion of auditors that would recommend the accounting treatment that was used by the client. A situation in which responses differed greatly from the proportion given in the case information would suggest that subjects disbelieved this information. Such disbelief would reduce the likelihood of observing an effect for this variable.

4.4.2.4.2 Checks of maintained hypothesis:

These checks are the same as in experiment 1 (see section 4.3.2.4.2).

CHAPTER 5

RESULTS AND DISCUSSION

5.1 Experiment 1: Non-audit judgment situation

5.1.1 Results: (For mean responses see Appendix B.)

5.1.1.1 Overview:

The manipulation checks for the variables are presented in Table 11 (see Appendix C for details).

Table 11: Experiment 1: Checks of manipulations

Check	Result
EXPNOV:	
1. Prior experience in CA firm by students?	none
2a. Correlation of auditors' experience variables with responses?	no
b. Effect on responses by students':	
year in programme?	$p < .05$
major area?	no
future plans?	no
PRIME:	
1. Recognition of manipulated information?	90% correct
2. Response to priming question in accordance with instructions?	usually
3. Subjects realized that they were being primed?	2 students (dropped)
4. Subjects believe simulation would aid in the judgment task?	77% did
ACT:	
1. Recognition of manipulated information?	88% correct
2. Abnormality underlying effect of manipulation?	no
3. Probability of investing mediating effect of manipulation?	no

It appears that manipulations were attended to. There were also two questions relating to the maintained hypothesis that people are capable of constructing mental models. Ninety-four per cent of subjects said that they use mental simulation in their judgments and all but two of these subjects were able to give an example. Thus most subjects believed that they could construct mental models. Results of the task in which subjects recalled the details of an internal control narrative are consistent with the idea that the auditors were able to mentally model the system. (See Appendix A for a description of the results related to this task.)

The results of these checks on manipulations and the maintained hypothesis have provided evidence that prerequisite conditions exist for valid tests of hypotheses. The hypothesis test results for experiment 1 are summarized in Table 12. Analysis of variance results for all main effects and interactions are presented in Appendix B along with the related mean responses.

Table 12: Experiment 1: Hypothesis Test Results.

Part 1: Simulation of outcomes of potential actions:

	Prediction (Table 3)	Result
H1	Mean likelihood assessment lower in primed than in unprimed condition for both auditors and students.	no significant difference

Part 2: Counterfactual simulation in reacting to outcomes:

	Prediction (Table 4)	Result	
		REGRET	CRITICISM
H4	Mean regret/ criticism higher in action condition than in inaction condition.	2-way interaction (p < .05). Mean higher in action condition for students only (p < .01).	3-way interaction (p < .10) Mean lower in primed condition only for auditors in inaction condition (p =.05)
H6	Mean regret/ criticism lower in primed condition than in unprimed condition	Mean marginally lower in primed condition (p < .10)	

5.1.1.2 Part 1: Simulation of outcomes of potential actions

5.1.1.2.1 Results of hypothesis tests:

The analysis of variance revealed that the apparent difference in means for the primed vs. unprimed subjects was not significant (F(1,44) = 1.53).

(See Table 17 in Appendix B for mean responses.) There was no interaction between EXPNOV and PRIME (F < 1).

5.1.1.2.2 Related analyses:

The difference between the mean responses for auditors and students was marginally significant (F(1,44) = 3.8; p < .10). These means are graphed in Figure 5.

Figure 5: Mean likelihood of becoming a partner — auditors vs. students

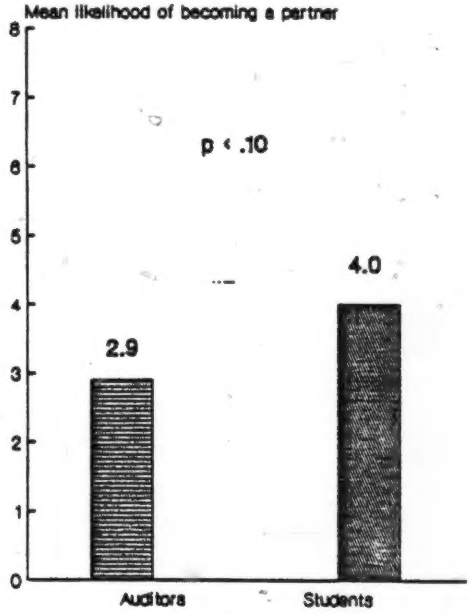


Table 13 summarizes the responses given in answer to the questions "What would you do in this situation?"

Table 13: Responses to the Question, "What would you do in this situation?"

	Auditors		Students		
	Primed	Unprimed	Primed	Unprimed	
Become a partner in the business	1	0	3	6	10
Do not become a partner in the business	5	8	3	3	19
Other:					
Collect more information	6	4	5	3	18
Become a limited partner	0	0	1	0	1
	12	12	12	12	48

The Chi-square test indicated that EXPNOV and the responses to this question were not independent--Chi-square(2, N=48) = 9.03; $p < .05$). (The categories within "other" were collapsed for the analysis.) The students were more likely to become a partner than were auditors. The action that the subject would take in the situation was not dependent on the priming variable.

The reasons given for the responses were as follows (some subjects gave more than one reason):

Become a partner in the business:	
Good opportunities for gain despite risk:	3
The individual in the case is young:	3
"I'm a risk taker"	2

Other	3
Do not become a partner in the business:	
"I'm risk averse/conservative"	7
Not worth the large risk	5
Unproven product/too speculative	4
Other	4

It was suggested by several subjects that their responses to this question were affected by their risk preference. This risk preference may have also affected their earlier likelihood assessments that the individual in the case would become a partner in the business. This source of within-cell variation could obscure an effect of the manipulated variables. The following analysis on the likelihood assessments was done to try (admittedly in a rough fashion) to control for the risk preference:

An analysis of variance to test the effect of the priming variable on the likelihood assessment was done for only the subjects answering "Do not become a partner in the business" to the question "What would you do in this situation?" The assumption behind this procedure was that this group would be more uniform as to risk preference than was the entire sample of subjects. (There were too few subjects saying that they would become a partner to do a similar analysis for that group.)

Because a preliminary analysis revealed a problem with heterogeneity of variance, three subjects were randomly dropped to achieve equal cell sizes (Edwards (1985, pp. 171-172) states that heterogeneity of variance is not a problem when cell sizes are equal.)

This analysis showed a significant effect for PRIME (for this group of subjects (N=16)) (F (1,14) = 4.93; p < .05). The mean likelihoods were 1.5 for those primed and 3.4 for those not primed (the predicted direction). In this group there was no difference between auditors' and students' assessments (F < 1).

5.1.1.3 Part 2: Counterfactual simulation in reacting to negative outcomes.

5.1.1.3.1 Results of hypothesis tests:

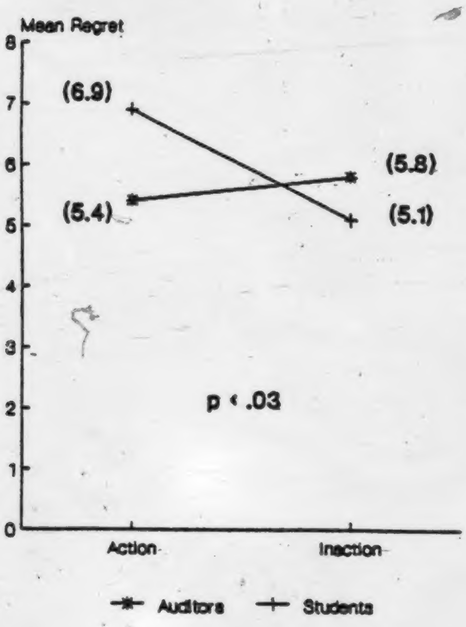
REGRET:

In part 2 of the experiment, subjects answered the question, "How much regret does Pat Thompson [the individual in the case] feel?" after finding out that Pat decided to become a partner in the business and the business failed.

The analysis of variance for this dependent variable (saturated model) showed a significant EXPNOV by ACT interaction (F(1,40) = 4.68; p < .05). This interaction indicated that there was a different effect for the auditors and students for the action/inaction variable.

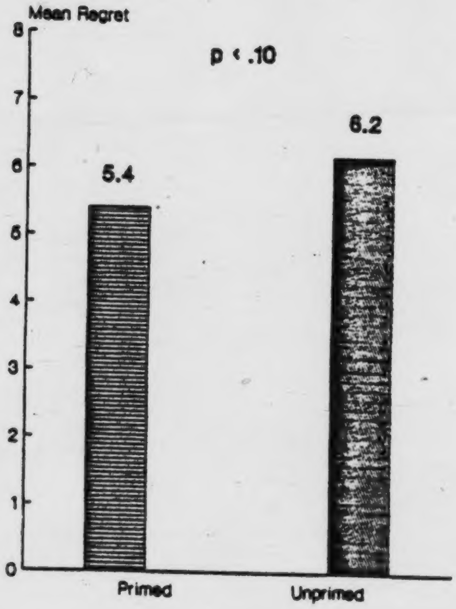
Analysis of variance was done for the auditors and students separately. The analysis revealed a significant effect for the variable ACT for students (F(1,22) = 9.84; p < .01). The means were 6.9 for those students provided with an action in the events leading up to the negative outcome and 5.1 for those who were not provided with this action. This was the predicted direction. The ACT variable was not significant for auditors (F < 1). The interaction is graphed in Figure 6.

Figure 6: Experiment 1: Mean regret by auditors and by students in action and inaction conditions



The analysis of variance for the dependent variable, REGRET, also showed a marginally significant priming effect (F(1,40) = 2.85; $p < .10$). The means were 5.4 for primed subjects and 6.2 for unprimed subjects. This was the predicted direction. The means are graphed in Figure 7.

Figure 7: Experiment 1: Mean Regret for primed and unprimed subjects



CRITICISM:

The other dependent variable in this part of the experiment was CRITICISM--the subjects' assessments of the criticism by others due to the incident.

In this analysis[7] there were no significant main effects or two-way interactions. The three-way interaction (EXPNOV by PRIME by ACT) was only marginally significant ($F(1, 40) = 2.92$; $p < .10$).

This marginal effect appears (from examination of the means) to have been caused by a two-way interaction between the PRIME and ACT for the auditors but not for the students. ANOVA was performed separately for auditors and students. The results were significant at .05 on the PRIME by ACT interaction for the auditors ($F(1, 20) = 4.31$). For students this interaction was not significant ($F < 1$). The PRIME by ACT interactions are graphed in Figures 8a and 8b.

Figure 8a: Experiment 1: Mean Criticism for primed and unprimed auditors in the action and inaction conditions

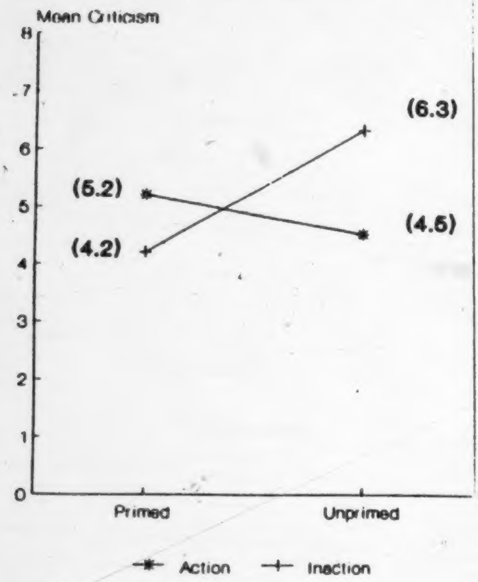
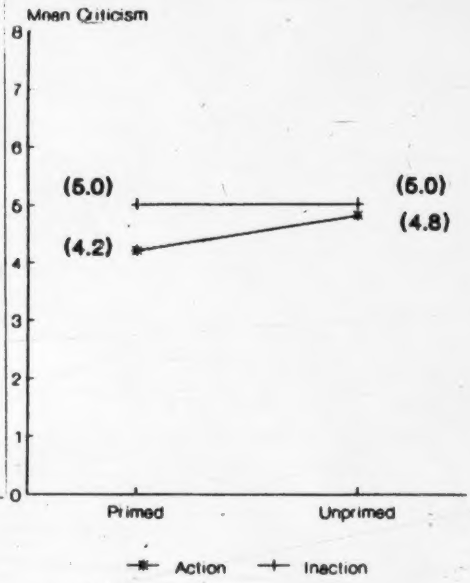


Figure 8b: Experiment 1: Mean Criticism for primed and unprimed students in the action and inaction conditions



The graph in figure 8a shows that in the inaction condition, those auditors primed with the negative outcome assessed less criticism than those not primed (means 4.2 and 6.3, respectively). Analysis on the inaction condition for auditors alone showed an effect for PRIME at .05 (F(1, 10) = 4.82). In the action condition there was no difference between the mean criticism for primed and unprimed auditors (F < 1).

5.1.1.3.2 Related analyses:

REGRET:

It was conjectured in chapters 3 and 4 (but not formally hypothesized) that another easily available chain of events for the subjects to simulate would be those events following the course of action that subjects had earlier suggested in the first part of the experiment. Such an occurrence would be consistent with a negative correlation between the variables INVEST and REGRET and also with a relationship between REGRET and the action earlier suggested by the subjects. In this experiment neither of these things happened.

CRITICISM:

In order to determine whether the action previously suggested by subjects had an effect on the criticism assessments, a correlation was calculated between INVEST and CRITICISM. The correlation was not significantly different from zero. The analysis of CRITICISM by the previously suggested action also showed no relationship.

5.1.2 Discussion:

5.1.2.1 Part 1: Simulation of outcomes of potential actions

The results for the test of simulation of potential consequences were not as predicted in that the priming variable did not significantly affect assessed likelihood that the individual would decide to become a partner in a business producing and marketing an innovative new product. This was the case for both auditors and students.

A possible cause of the null result is within-cell variance due to risk preferences of the subjects (as indicated by subjects' reasons for their answers). As described earlier, an analysis was done of the effect of the priming variable on the likelihood assessments only for subjects who later said that they would not have become a partner in the business. It was thought that this might be a more homogeneous group with respect to risk preference. In this group the priming manipulation did significantly affect likelihood assessments in the predicted direction.

This result does provide some support for the contention that making a chain of events easy to simulate through priming affects judgments. However, it also suggests that future research may be improved by explicit measurement of risk preferences of subjects if a gambling task is to be used.

5.1.2.2 Part 2: Counterfactual simulation in reacting to negative outcomes

The presence of counterfactual simulation in reacting to negative outcomes was tested through assessments of regret and of criticism by others after finding out that the business had failed. The independent variable representing action versus inaction was manipulated at this stage.

It was found that for students, significantly higher regret occurred when the negative outcome was preceded by an action (change of decision) than when the outcome was not preceded by this action. The result is consistent with the idea that for the students, the presence of this change of decision made a better outcome easy to simulate by undoing the change. Comparison of this better outcome to the actual outcome raised the level of regret relative to students who were not told of a change of decision. Thus hypothesis 4 was supported for students.

It is not known why the auditors did not respond to the manipulation in the way that the students did. There was no difference between number of auditors vs. students responding correctly to the manipulation check requiring recognition of the presence/absence of a prior decision by the individual in the case.

The priming manipulation had a marginal effect on the regret responses of subjects. Assessments of regret were (marginally) lower in the primed condition (in which subjects explained how a catastrophic loss could occur) than in the unprimed condition. This result is consistent with the idea that feelings of regret are blunted when an easily imaginable alternative (primed) scenario leads to the same outcome as actually occurred (hypothesis 6). This result also shows that the priming manipulation was attended to and was effective even in the absence of an effect in the judgment task.

The results related to the regret assessments provide support for the presence of counterfactual simulation in reaction to negative outcomes. The manipulation check results suggest that it may not be the abnormality of action relative to inaction that was behind the effect observed (see Appendix C). More research is needed that addresses the relationship between the abnormality construct and the action versus inaction operationalization.

In the other reaction to the negative outcome, subjects were to play the role of an observer instead of the person involved in the negative outcome. They were to assess the amount of criticism by others that would occur due to the incident. Such an assessment is hypothesized to involve the use of counterfactual simulation as well, with greater criticism occurring if an alternative, easily simulated course of events leads to a better outcome.

The only effect for this variable was a marginally significant three-way interaction. This interaction was caused by a significant two-way interaction between the action and priming variables for the auditors but not for the students. This two-way interaction was due to an effect for the priming variable in the inaction condition but not in the action condition for the auditors.

This evidence is consistent with the idea that in absence of an easily undoable action preceding the business failure, the primed auditors simulated the course of events that they were primed with. Since this simulation ended up with a loss as well, the outcome may have seemed somewhat unavoidable and thus less subject to criticism.

5.2 Experiment Two: Audit judgment situation

5.2.1 Results: (See Appendix D for mean responses)

5.2.1.1 Overview

The manipulation checks are presented in Table 14. They are described in greater detail in Appendix E.

Table 14: Experiment 2: Checks of manipulations

Check	Result
EXPNOV:	
1. Auditors and students have different knowledge about audit outcomes (as assumed)?	yes
2. Students have prior CA firm experience? (assumed not)	nothing significant
3a. Correlation of auditor experience variables with responses	no
b. Effect on responses of students' year in programme, major, future plans	no
PRIME:	
1. Recognition of manipulated information?	91% correct
2. Response to priming question in accordance with instructions?	usually
3a. Effect of priming on post-audit events listed	$p < .05$
b. Effect of priming on likelihood, importance of post-audit events	no
4. Extreme responses to probability assessment that a randomly chosen auditor would have concurred?	rarely
5. Extreme responses to estimated proportion of auditors recommending all current recognition?	19% said $< .1$
6. Subjects realized that they were being primed?	none
7. Did priming teach students the relevant contingency relationships?	no
8. Subjects believe simulation would aid in the judgment task?	78% did
ACT:	
1. Recognition of manipulated information?	75% correct[8]
2. Abnormality underlying effect of ACT?	no
3. Effect of ACT mediated by probability of concurrence?	no
FREQ	
1. Recall of manipulated information	88% correct
2. Subjects believed manipulated information?	82% didn't

It appears that manipulated information was attended to. However, most subjects apparently disbelieved information manipulated for the variable FREQ reducing the likelihood that this variable would have an effect on responses.

Two questions related to the maintained hypothesis that people are capable of constructing mental models. Seventy-eight per cent of the subjects said that they use simulation of mental models in their judgments and 69% of the subjects were able to give at least one example. Thus, most of the subjects believed that they have this capability and use it. The results of the task involving recall of an internal control narrative are consistent with construction of mental models of this system by the auditors. The results relating to this task are outlined in Appendix A.

The checks of manipulations and of the maintained hypothesis have provided evidence that prerequisite conditions exist for valid tests of hypotheses (with the exception of the disbelief by subjects of the manipulated frequency information). The results of hypothesis tests for experiment 2 are summarized in Table 15. Appendix D shows ANOVA results for all main effects, two-way interactions, and (where relevant) three-way interactions along with the related means.

Table 15: Experiment 2: Hypothesis Test Results

Part 1: Simulation of outcomes of potential actions

	Prediction (Table 7)	Result (CONCUR[9])
H2	Different mean likelihood of concurrence for auditors and students	Mean likelihood of concurrence lower for auditors than students ($p < .05$)
H3	Linear by linear interaction for PRIME and EXPNOV	no

Part 2: Counterfactual simulation in reacting to outcomes

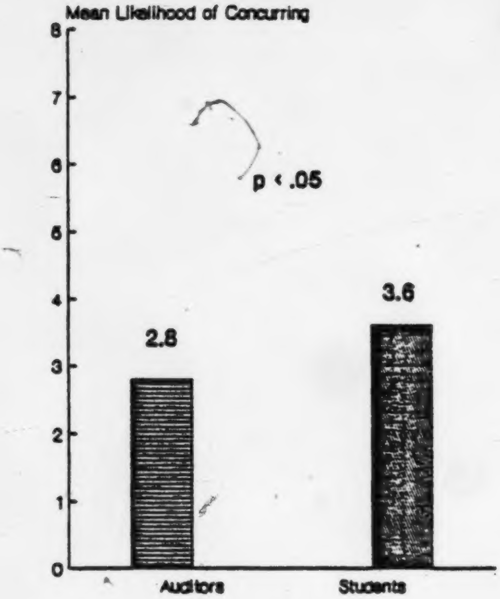
	Prediction (Table 8)	Result	
		REGRET[7]	CRITICISM
H4	Mean regret/ criticism higher in the action condition than in the inaction condition	no	Mean higher in action condition ($p < .05$)
H5	Mean regret/ criticism higher in low frequency condition than in high frequency condition.	no	no
H6	Mean regret/ criticism for explanation conditions lower than those in other conditions of PRIME	no	Mean in explanation conditions marginally higher ($p < .10$)

5.2.1.2 Part 1: Simulation of outcomes of potential actions.

5.2.1.2.1 Results of hypothesis tests:

The analysis of variance on likelihood assessments of concurrence[9] showed a significant effect for EXPNOV (F(1, 110) = 4.34; p < .05) (Hypothesis 2). The auditors' responses on average were lower than those of the students. These means are graphed in Figure 9. There was no significant effect for PRIME (F < 1) nor for the EXPNOV by PRIME interaction (F < 1). The linear by linear interaction was not significant (F < 1)--(i.e. hypothesis 3).

Figure 9: Experiment 2: Mean likelihood of concurring for auditors and students



5.2.1.2.2 Related analyses:

After giving the likelihood assessment, subjects were asked the multiple choice question, "What course of action do you recommend in this situation?" Subjects could choose one of four options or could specify a different method of inducement recognition. The responses are in table 16.

Table 16: Responses to the Question "What course of action do you recommend in this situation?"

	Auditors	Students	
Recognize entire inducement in 1987 [the current year]	12	13	25
Recognize $200,000 of inducement in 1987 and $200,000 in 1988	1	24	25
Recognize the inducement over the term of the lease	42	22	64
Recognize the inducement over the term of the lease plus renewal option period	1	1	2
Other:			
Record against cost of assets and amortize	1	0	1
Offset against cost of leasehold improvements	1	0	1
Offset against moving expenses and recognize the balance over term of lease.	2	0	2
	60	60	120

A chi-square test of EXPNOV by recommended course of action was done. (The last four categories of responses were collapsed.) The test showed that auditors' and students' responses differed (Chi-square (2, N = 120) = 29.43; $p < .001$) with students being less likely than auditors to recommend recognizing over the term of the lease and more likely to recommend recognizing over two years.

For those answering "recognize entire inducement in 1987," the reasons were as follows:

Signing the lease was the critical event for revenue recognition	10
The inducement doesn't need to be repaid if the lease is cancelled	6
Probability of collection is high	3
Offsets moving costs	2
Other	4

For those answering "recognize $200,000 of inducement in 1987 and $200,000 in 1988," the reasons were as follows:

Should recognize as received	12
Inducement not repayable if lease cancelled	9
Other	4

For those answering "recognize over the term of the lease," the reasons were as follows:

Matching of costs and benefits	23
Reduction of future rent expense	19
Inducement was paid for signing lease for entire term	11
Best reflects economic substance	3
Conservatism	3
Inducement and lease are one transaction	2
Compromise	2
Other	10

For those answering "recognize over the term of the lease plus renewal period," The reasons were as follows:

Matching	1
Inducement is for entering lease over entire term	1

5.2.1.3 Part 2: Counterfactual simulation in reacting to negative outcomes:

5.2.1.3.1 Results of hypothesis tests:

REGRET

After finding out that the client went bankrupt and that an investor is suing the auditing firm, subjects first took the perspective of the audit manager in responding to the question "How much regret does Pat Thompson [the audit manager] feel?"

The analysis of variance[7] was carried out using the four independent variables EXPNOV, PRIME, ACT and FREQ and the dependent variable REGRET. The analysis was done for all main effects, two-way interactions and three-way interactions.

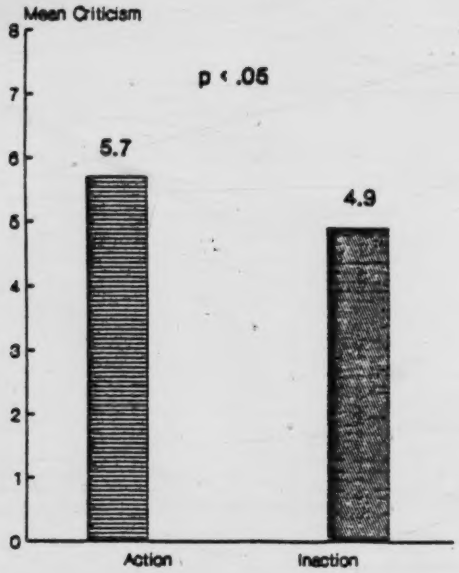
The analysis of variance showed no significant effects. Inspection of the means for each of the priming conditions indicated that further analysis would not be fruitful.

CRITICISM:

After assessing regret, subjects then answered the question "To what extent will Pat [the audit manager] be criticised by others due to this lawsuit?" The four independent variables EXPNOV, PRIME, ACT and FREQ and the dependent variable CRITICISM were used in the analysis of variance. All main effects, two-way interactions and three-way interactions were included in the analysis.

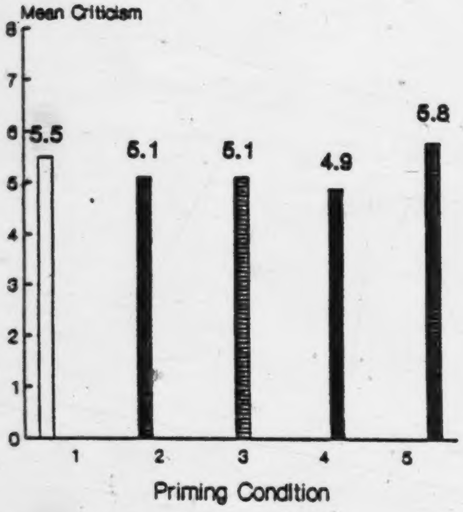
This analysis revealed a significant main effect for ACT (F(1, 84) = 5.67; $p < .05$) on the criticism variable. The main effect for ACT is graphed in Figure 10.

Figure 10: Experiment 2: Mean criticism by subjects in action vs. inaction condition



There were also some interesting results involving the priming variable. The means for the priming conditions are graphed in Figure 11.

Figure 11: Experiment 2: Mean Criticism by subjects in different priming conditions



1: litigation explanation; 2: litigation exposure; 3: no prime; 4: loss of client exposure; 5: loss of client explanation

The mean criticism assessments were higher for the explanation priming conditions than for the other conditions. (Note that this is just the opposite of what was predicted.) A contrast was done to find out if the means for the explanation conditions were significantly different than for the other conditions.

The effect was marginally significant ($F(1, 84) = 3.47$; $p < .10$). The residual sum of squares for prime was not significant ($F < 1$).

5.2.1.3.2 Related analyses:

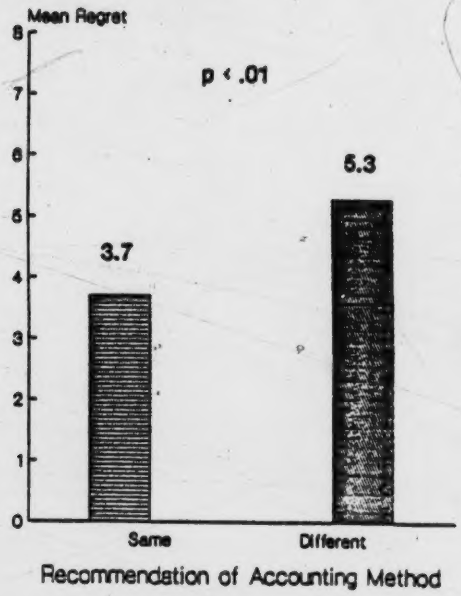
REGRET:

It was conjectured in chapters 3 and 4 (but not formally hypothesized) that the accounting method previously recommended by subjects when doing the judgment task may provide an alternative chain of events to simulate when later reacting to the negative outcome.

The mean regret assessments for those previously recommending current recognition of the inducement (i.e. the same method that was agreed to by the audit manager) was 3.7. The mean response was 5.3 for those subjects recommending a different (more conservative) accounting method than was agreed to by the audit manager (5.3 for those recommending recognition over two years and also 5.3 for those recommending recognition over the term of the lease or longer).

The ranks of REGRET[7] were regressed against a variable representing the previously recommended accounting method (either the same as or different from the method agreed to by the auditor). The mean responses for the same versus different prior recommended accounting method were found to be significantly different ($t = 2.88$; $p < .01$). The means are graphed in Figure 12.

Figure 12: Experiment 2: Mean Regret for subjects recommending same vs. different accounting method as manager



Correlations were calculated between REGRET and the previously assessed likelihood that the audit manager would concur with the client (CONCUR). The correlation was -.23 (significantly different from zero (t = -2.57; p < .05)).

Another interesting occurrence for the regret assessments was a difference in variance for auditors' versus students' responses. For the auditors the mean was 4.5 with a standard deviation of 2.9. For the students the mean was 5.4 and the standard deviation was 2.0. Hartley's test for homogeneity of variance showed that the variances for the two groups were significantly different ($p < .05$).

Further analysis was done to see what caused the large variance in the auditors' regret assessments relative to those of the students. It was found that the auditors were much more likely to use the end points on the scale than were the students. In fact, the modal response for the auditors was 8 (extreme regret) and the second most frequent response was 0 (no regret).

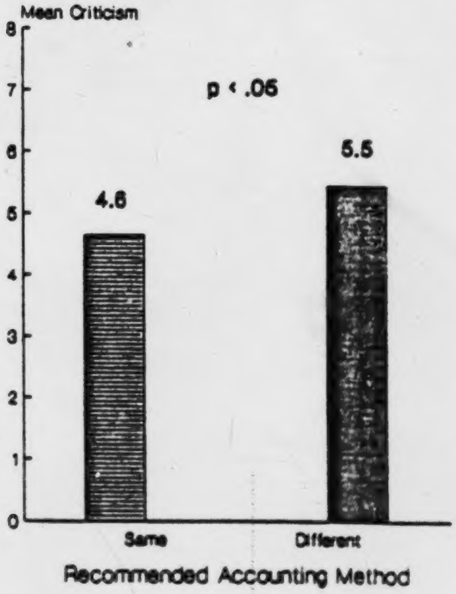
In contrast, the students' most frequent responses were 6 and 7 and only five students (compared to 24 auditors) used the end points on the scale. The chi-square test was used to test the independence of REGRET and EXPNOV. The test indicated that they were not independent (Chi-square (8, $N = 120$) = 24.04; $p < .01$). (Some care needs to be taken in interpretation here as more than 20 percent of cells had an expected frequency of less than 5.)

CRITICISM:

The criticism variable was analysed[7] to determine whether there was a relationship between criticism and whether or not the subject had suggested a different accounting method than the one agreed to by the audit manager. This was done to provide evidence as to whether this course of events may have provided an alternative scenario for a simulation with which to assess criticism by others.

As was the case with REGRET, the previously recommended accounting treatment was related to the criticism assessment (t = 2.20; $p < .05$). The criticism was higher by subjects who had previously suggested a different accounting method than the audit manager agreed to. The mean responses for these two groups are graphed in Figure 13.

Figure 13: Experiment 2: Mean Criticism for subjects recommending same vs. different accounting method as manager



The correlation between CRITICISM and the prior assessed likelihood that the audit manager would concur with the client (CONCUR) was -.11. This was not significantly different from zero.

5.2.2 Discussion:

5.2.2.1 Part 1: Simulation of outcomes of potential actions:

There was a significant difference between auditors' and students' responses to the audit judgment task. Thus hypothesis 2 was supported. The auditors, on average, assessed lower likelihoods of concurrence with the client than did the students. This result could be due to both environmental and accounting knowledge factors.

As noted earlier there were many differences in auditors' and students' understanding of the audit environment. If auditors were doing a simulation of consequences in order to make the audit judgment, their more conservative responses would suggest the presence of litigation or financial statement error consequences in the simulation of many auditors. The large number of references in the post-audit events question to the possibility of error/fraud by auditors relative to students is consistent with this idea.

However, as observed in the subjects' responses to the question "What course of action do you recommend in this situation", there were many more students than auditors who preferred recognition over two years. This may imply an accounting knowledge element as well in explaining the observed difference between auditor and student likelihood assessments.

The results for the test of the simulation of outcomes (hypothesis 3) were not as predicted in that the priming variable did not significantly affect auditors' assessments of likelihood of concurrence in the audit judgment task. The possibility that the lack of result was due to inattentiveness, carelessness or lack of interest can be ruled out. The manipulation checks showed good recognition of the information primed.

There are several possible explanations for the lack of an effect. The task may not have been sufficiently complex. If this was the case it may have been very easy for both auditors and students to simulate a plausible outcome (not necessarily the one primed). In particular, the response scale suggested only two possible actions--concur versus do not concur with the client. Perhaps if subjects had been given other possible actions (e.g., involving the engagement partner, compromising on some other issue, etc.) the complexity of the relevant simulations would have been increased.

It should be noted that auditor pilot-test subjects believed that the task was realistic. In addition to this, subjects later had the option of recommending other possible actions and did not recommend actions such those described above (see Table 16).

Another possible explanation is that the priming of one outcome might automatically cause simulation of other outcomes (multiple simulations). This would reduce the possibility of observing differences between groups primed with different outcomes.

Such an occurrence would not be consistent with the sequential process described in chapter 3. It is also inconsistent with the idea expressed by Gregory, Cialdini, and Carpenter (1982) that the simulation of one scenario may impair one's ability to simulate alternative sequences.

Alternatively, perhaps the auditors held strong beliefs about the correctness of their preferred accounting method. Evidence consistent with this view was that 19% of the subjects estimated that less than 10% of auditors would recommend bringing the entire inducement into the current year's income. This possible explanation for the results is inconsistent with the hypothesis that mental simulation was used in the judgment.

Finally, it is possible that the auditors were using mental simulation but the contents of the simulation were so routinized from past experience that priming did not influence the content of the simulation sufficiently to affect responses.

5.2.2.2 Part 2: Counterfactual simulation in reacting to negative outcomes:

In this part of the experiment, subjects first took the perspective of the auditor in assessing his/her regret after finding out that the client had gone bankrupt and an investor had brought a lawsuit against the auditing firm.

There was no difference in mean response to this question by auditors and students. However, there was a significant difference in the variances--the auditors having a much higher variance than the students. It was observed that the auditors were much more likely than were the students to use the end-points of the scale (no regret, extreme regret). This result is consistent with the idea that the auditors came into the experiment with strong convictions about the way that such problems as lease inducements should be handled.

There was also no effect on regret assessments for the variable representing the presence versus absence of an action leading up to the negative outcome. Nor was there an effect for the manipulation of the high versus low frequency that other auditors would have recommended the current recognition of the inducement. The good recognition/recall in the manipulation checks suggests that lack of attentiveness was not the cause of this lack of results. The subjects' own estimation of the proportion of auditors who would recommend the current recognition method was usually different than the information provided to the subjects. Thus, the manipulation of the frequency variable may have been ineffective because subjects did not believe the information.

Further analysis indicated that a factor that was associated with regret assessments was the accounting method previously recommended by subjects during the judgment task. That is, those who had previously recommended that the best way to handle the inducement was to recognize it in the current year (the same method agreed to by the audit manager) assessed less regret at the poor outcome than did subjects who had recommended use of a different method.

The result is consistent with the idea that the prior recommendation of an alternative accounting method made it easy to simulate a scenario in which alternative method was used and a better result ensued. When one can easily simulate an alternative course of events leading to a better outcome than actually occurred, regret is increased. The finding of a negative correlation between the assessment of likelihood that the auditor would concur and the later assessment of regret (after concurrence) also supports this idea.

After assessing regret, the subjects then took the perspective of an observer in answering the question "To what extent will Pat [the audit manager] be criticized by others due to this lawsuit."

The analysis revealed that the presence of an action prior to the negative outcome significantly increased criticism assessments relative to the situation in which this action was not present. This result is consistent with the proposition that subjects who were told of the auditor's change in position (the action) could easily simulate a better outcome by leaving out that change in position. Such a simulation would increase criticism relative to subjects who were not given information about this easily undoable action.

The manipulation check results suggest that it may not be the abnormality of action relative to inaction that was behind the effect observed (see Appendix E). More research on the relationship between the abnormality construct and the action vs. inaction operationalization would be valuable.

There were also some marginal results for the priming variable on the criticism assessment. The criticism for subjects in the explanation conditions of the priming manipulation was higher than for subjects in the other conditions. (Recall that in the explanation conditions subjects explained the process by which a particular outcome might occur - in one condition the outcome was litigation and in the other it was loss of client.) The result was the opposite of that predicted.

With hindsight, it may be that the higher criticism for the litigation outcome was caused by different factors than was the higher criticism in the loss of client condition. An explanation that is consistent with the use of simulation may be associated with the high criticism for those in the loss of client explanation condition.

Those explaining the course of events leading up to a loss of client would have an alternative action available for inclusion in a simulation--that is, non-concurrence. From the perspective of a critical observer, loss of client is a much less criticizable outcome than litigation and is, in fact, worthy of praise rather than criticism.

The relatively high level of criticism by subjects in the litigation explanation condition is more difficult to speculate on. It may be that the previous process of describing the course of events leading up to litigation made subjects later have the feeling that the audit manager should have known that this could have happened if s/he concurred with the client. (See Fischhoff, 1975 for a discussion of hindsight bias.)

It was also found that, as was the case with regret assessments, the previously recommended accounting method was related to criticism assessments. The mean criticism was higher for subjects that had previously recommended a different method than the one agreed to by the auditor (relative to those who had recommend the same method that was agreed to by the auditor). This result is consistent with the idea that at least some subjects simulated the course of events associated with use of this alternative accounting method and arrived at a better simulated outcome than actually occurred. This would result in higher criticism.

5.3 General discussion:

It was hypothesized that in the non-audit judgment task, auditors and students would be affected by priming and in the audit judgment task, only auditors would be affected by priming.

It should be emphasized at this point that priming was used as a method of tracking the thought process of the auditors and not as a way of proving that auditors could tricked or shown to be biasable. (There is already ample evidence that they can be, as can all individuals given the right conditions.) In this research, the predicted priming effect was a means to the end of providing evidence about the process of mental simulation; it was not an end in itself.

As it turned out, the priming manipulation information did not affect the judgments made in either experiment. There is evidence in both experiments, however, that this variable did have impact on assessments made later on (regret and criticism for the non-auditing experiment and criticism for the auditing experiment).

An analysis controlling for a surrogate for risk preference provided some support for the use of simulation in the non-audit judgment task and provided some evidence that the priming methodology can be useful in testing this idea.

The lack of an effect for the auditors in the audit judgment task may have been due to insufficient task complexity or to automatic simulation of several outcomes. A more likely explanation is that the auditors may have come into the experiment with strong prior opinions on how this sort of transaction should be handled. Another reasonable explanation is that auditors simulated a scenario learned through experience and this scenario was not influenced sufficiently through priming.

The responses to the audit judgment task were significantly different for auditors versus students, with the auditors being more conservative. The difference between auditors' and students' responses in the non-auditing task was marginally significant with the auditors' responses again being more conservative.

In part 2 of the experiments there was support for the idea that counterfactual simulation occurs during the course of reacting to a negative outcome. In the non-auditing situation the presence of an action prior to the negative outcome affected the regret assessments (of students only) but not the criticism assessments. In the auditing situation, criticism (but not regret) was affected by the action versus inaction manipulation. This result may be a reflection of the task. That is, one may naturally feel more empathy for a young entrepreneur whose business failed than for an audit manager who agreed with the client and ended up in a litigation situation. Criticism may be a more relevant reaction in the audit situation as eventually the courts would be asked to make a similar assessment (blame).

It was likely not abnormality vs. normality that underlay the effect of the action vs. inaction variable on assessments of regret and criticism (in contrast to the suggestion by Kahneman and Miller, 1986). What may be operationalized by the action vs. inaction manipulation is a "social inertia" construct.

If a person disturbs the "inertial flow" of a chain of events and a poor outcome occurs, then it is this disturbance that is easy to undo in a mental simulation. Thus, the individual will experience a stronger negative reaction to the outcome than if s/he had not intervened. In this research, the intervention was operationalized as a change of decision or position.

The marginal effect of priming on regret and criticism assessments in the non-auditing situation and on criticism assessments in the auditing situation provides further evidence consistent with the use of counterfactual simulation in reacting to negative outcomes.

It was interesting that regret and criticism in the auditing situation were related to the previously recommended accounting treatment suggested by the subjects. A similar result did not occur in the non-auditing experiment.

The post-audit events analysis (see Appendix E) revealed several differences in the types of events and their likelihoods that auditors versus students thought could occur after an audit. This shows that there was different understanding on the part of auditors versus students with respect to the audit environment related to possible outcomes of the audit.

CHAPTER 6

SUMMARY AND CONCLUSION

The purpose of this dissertation was to provide evidence regarding auditors' judgment processes surrounding evaluation of outcomes. Two phases of judgment involving the evaluation of outcomes are:

1) the bridging of the output of the information processing stage and the action choice stage through assessment of possible outcomes of potential actions, and

2) the feedback phase through reacting to outcomes of past actions.

For both of these phases of judgment it was hypothesized that mental simulation may play a role. A conceptual framework was described and a method of gathering evidence regarding the role of simulation in each of these phases of judgment was outlined.

For the phase of judgment involving the evaluation of possible consequences of potential actions, the methodology consisted of having some subjects, before doing a judgment task, explain the course of events leading up to a particular negative outcome. This task was intended to cause the activation of representations in memory (priming) of events in that causal chain and the connections between those representations provided that the subject has considerable experience so as to have developed sufficiently strong connections.

Two types of judgments were utilized so as to demonstrate a situation in which the effect of priming on auditors and on non-auditors would be similar (non-auditing task) and one for which priming would affect auditors but not non-auditors (an audit judgment task).

The priming procedure did not have this effect. There was some evidence that priming did affect responses in the non-auditing judgment task after risk preference was controlled for. However, priming did not affect judgment in the auditing task. The lack of an effect for auditors may have been due to strongly held opinions on the judgment issue that were not easily influenced by priming. Alternatively, perhaps auditors tend to simulate the same types of outcomes for many of their audit judgments. If so, simulation containing these events may be so well practiced that it is not sufficiently influenced by priming to affect results of judgment. The priming variable did seem to affect later assessments made by subjects.

The other phase of judgment studied was the feedback phase. Here counterfactual simulation of alternative scenarios is thought to play a role in one's reaction to a negative outcome.

In the study, subjects found out about a negative consequence occurring after the person described in the judgment task had taken a particular action. They were first asked take the perspective of the individual in the case by assessing how much regret he/she felt about the negative outcome. Then subjects took the perspective of an observer by assessing criticism of the individual in the case. In both the auditing and the non-auditing experiments, variables thought to have an influence on counterfactual simulation were manipulated.

It was found that the presence versus the absence of an action in the course of events leading up to the negative outcome increased regret for the non-auditing situation (for students only) and increased criticism in the auditing situation. This result is consistent with the idea that a mental simulation was carried out with this action removed resulting in a better simulated outcome. Comparison of this better simulated outcome with reality increased regret and/or criticism.

It was also found that priming of certain chains of events seemed to affect assessed regret and criticism in the non-auditing situation. The result is consistent with the idea that simulating a chain of events (the primed events) leading to a similar outcome to the one that occurred may make that outcome seem somewhat unavoidable and induce less regret or criticism than would otherwise have been felt.

In the audit judgment task subjects primed by explaining how a loss of client or a litigation situation could occur assessed marginally higher criticism than subjects in the other conditions.

It was also found that a prior judgment about how an item should be accounted for was related to regret and criticism assessments in the audit judgment experiment. (A parallel result was not observed in the non-auditing experiment). This result is also consistent with the occurrence of counterfactual simulation in reacting to outcomes. If the suggested accounting method (or perhaps a strongly believed in method) is different than the method actually agreed to by the audit manager in the case, then a better outcome is easily simulated by having the audit manager insist on this preferred accounting method. Increased regret and criticism would result.

Overall, there was no support for the hypothesis that mental simulation of outcomes of potential actions is an element of audit judgment. Some results from the non-auditing experiment suggested that the priming methodology could be useful in further research into this proposed process.

There was support for the use by auditors of counterfactual simulation in responding to negative outcomes. In particular the presence versus the absence of an easily undoable action in the course of events leading up to the negative outcome affected the assessments of criticism. Priming of an alternative course of events may also have affected criticism assessments and thus is a possible factor influencing the way auditors view the actions of their peers and in the way disciplinary bodies may view auditors' actions. These effects were not limited to auditors' assessments. Thus, counterfactual simulation may also affect criticism by members of the public and so affect auditors' reputations.

The observation of evidence supporting counterfactual simulation in the non-auditing experiment provides further evidence that this phenomenon occurs naturally in human cognition.

There are many potential avenues for future research. More research could be done to try to determine whether simulation is utilized in the phase of judgment involving evaluation of consequences of potential action. Perhaps a different type judgment task would reveal whether such a process is utilized by auditors.

For example, auditors often make judgments about the outcomes of client actions for the purpose of assessing the reasonableness of accounting estimates and contingencies. It may be possible to study the issue of whether mental simulation is utilized in this process with the method used in this dissertation. Alternatively, other methods of examining the proposed process can be developed and used.

Theoretical work could also be done which proposes other potential mechanisms by which auditors may evaluate outcomes.

In the area of counterfactual reasoning, research could be done to discover the types of reactions for which counterfactual simulation seems to be utilized. Research could be done into the types of factors that influence counterfactual simulation for auditors.

Criticism of auditors (by both auditors and others) and variables affecting this criticism may be a fruitful area of study. The issue of auditor litigation may be a helpful context in which to study the criticism of auditors.

There could also be more research into other aspects of auditor judgment potentially affected by mental simulation. For example, several subjects believed that they use simulation to imagine the effect of a judgment on financial statements and on financial statement users. Follow up work on the findings (Appendix A) supporting the idea that auditors construct mental models of internal control systems could be done.

These are only a few of the possible contributions to a body of research related to evaluation of outcomes in auditor judgment and to the broader fields of descriptive audit judgment research and expert judgment research.

Footnotes

1. Gleicher, Kost,Baker, Strathman, Richman, and Sherman (1988) speculate that the reason for this finding may be that positive outcomes tend to be taken at face value and do not initiate the "why" and "if only" thoughts that follow negative outcomes.

2. One of the 84 managers participating in the experiments neglected to fill in much of the crucial data and so was replaced.

Six of these participants were actually tax managers (three in each experiment) but were judged to have sufficient auditing experience.

The term "manager" is used throughout the dissertation. Some of the firms have employees called supervisors which are the equivalent of managers in most other firms. The term manager is used for all of these subjects to avoid confusion.

3. The possibility that this event might influence the judgment of local auditors was first explained to me by Brian Reid of the Edmonton office of a national accounting firm.

4. The assumption underlying this prediction was that mere exposure to the consequence does not cause all auditor subjects to automatically simulate events leading up to that consequence at the time of exposure. If this assumption was not valid then there would not be a difference between responses for the two priming conditions (explanation vs. exposure) for a given consequence.

5. A possible alternative result was thought to be a stronger effect on students than on auditors due to the priming manipulation. This would occur if the consequences normally simulated by auditors were so routinized that the auditors were not influenced by priming of the chain of events leading up to these consequences (that is, the experience factor swamps the recent activation factor). Furthermore, it was possible that requiring student subjects in the explanation conditon to explain how a particular consequence could have occurred could have the effect of teaching the accounting students these relationships. If this were to happen and if the students were able to recognize the incentive

implications underlying these consequences in relation to the judgment task then a priming effect might result for students in the explanation conditions (but not in the exposure conditions). Manipulation checks and additional questions were included to determine if any of the processes described above had occurred.

6. It should be noted that Miller, Turnbull and McFarland (in press) (in the initial study dealing with frequency) manipulated population frequencies while I manipulated sample frequencies. Also, Miller et al. dealt with events that were outcomes while I utilized potential causes of an outcome. Mental replication was suggested by Miller et al. to be the factor affecting normality perceptions.

The assumption behind my manipulations was that mental replication would not necessarily be limited to the contexts utilized by Miller et al. in their study. Thus, if mental replication did, in fact, underlie normality assessments, it should also affect judgments thought to be affected by perceived normality/abnormality.

7. The residuals for the analysis were not normally distributed (Lilliefors test $p < .05$). As no reasonable transformation resulted in normal residuals, the analysis done on ranked data is reported. (See Conover, 1980, p. 337)

8. It appears that several of the incorrect answers were due to a misunderstanding of the intent of the question. That is, some subjects believed that they were to restrict themselves to the original facts of the case rather than refer to the later information about the change in position. Thus, this percentage may well be understating the proportion of subjects who attended to the information manipulated for the action/inaction variable.

9. Because the residuals were not normally distributed (Lilliefors test, $p < .05$), a transformation was done on CONCUR. The natural logarithm was chosen because the data were positively skewed. The residuals from analysis of variance on the transformed data were normally distributed. Results of analysis of variance on the transformed data are reported.

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APPENDIX A: MENTAL MODELS OF INTERNAL CONTROL SYSTEMS

It was suggested by Waller and Felix (1984b, p. 41) that auditors may use mental models of internal control systems. In order to test this idea a discourse recall methodology was used.

It was hypothesized that expert auditors have the ability to construct a mental model of an internal control system through having had so much prior experience with different systems. Prior experience would provide connections in memory between representations of various possible elements of an internal control system. These connected representations in memory would allow an auditor that encounters a new system to very efficiently model this system by utilizing the the relevant existing connections.

Thus auditors upon reading an internal control narrative would be able to immediately construct a model of that system. When they are asked to later recall details of the internal control narrative they should be able to utilize the model (or reconstruct it very easily) for the recall process. The recall of auditors then would be expected to be quite different from that of non-auditors recalling the same narrative.

Previous research has found differences between high and low knowledge subjects in their memory for domain specific information in the domains of: baseball (Spilich, Vesonder, Chiesi, & Voss, 1979; Voss, Vesonder, & Spilich, 1980); computer programming (Pennington, 1985); Star Wars (Means, & Voss, 1985); soccer (Morris, Tweedy, and Gruneberg, 1985); and political science (Fiske, Kinder, & Larter, 1983; Tyler, & Voss (1982).

The methodology that was used in this experiment was similar to that utilized by Spilich et al. (1979) in a study of relative experts vs non-experts in the domain of baseball. Spilich et al. had subjects listen to part of an inning of baseball. The subjects then had to recall the details of the inning. Much better recall was observed for the high knowledge individuals.

The only auditing study previously using a recall methodolgy was by Weber (1980) who had subjects recall a list of computer controls that they had previously listened to. He found that the auditors recalled more of these controls than did students.

In this study the recall data of 60 audit managers was compared to that of 60 intermediate accounting students. Subjects first read a narrative describing an internal control system. (See Appendix G for a copy of the narrative.) They were later (after doing several other tasks) given the following instructions: "The second narrative described an internal control system. Please write down as much information from that narrative as you can recall."

The narrative described the sales-accounts receivable system of a hardware wholesaler in a considerable amount of detail. In this narrative the order of two of the paragraphs was deliberately reversed. The effect of this was to insert the information about the cash receipts function in the middle of a sequence about the sales function. If subjects had developed a model with which to understand the system, the natural order of the events would be important. If this is the case, one would expect to see auditors' recall data reversing the order of these paragraphs back to a more natural sequence of events. In addition, a few items that were in the narrative were irrelevant from a control standpoint. It was thought that the auditors would be more likely than students not to recall these items.

Coding of the recall data was done by one coder blind to condition. The propositions in the narrative were counted as being correct if the subject seemed to have recorded the gist of it. If the subject had recalled the proposition but there was an error in the detail, an error identifier was recorded beside the proposition number. If information not in the narrative was inserted, this was recorded beside the relevant proposition number or section identifier. All other data were also given codes.

To check the accuracy of the coding, a second coder chose a sample of ten subjects' recall data and coded these data independently. (A similar procedure was used by Spilich et al.) Of the 154 items coded by at least one coder, 134 were coded identically (87.5%).

The results were as follows:

The mean number of propositions correctly recalled was 8.3. The mean number of propositions correctly recalled by auditors was 12.3 and for students the mean number recalled was 4.3. These means were signficantly different ($t=7.05$; $p < .001$).

A similar analysis was done for propositions recalled but including propositions which had an error in the details. Here the mean number recalled was 9.1 with the auditors' mean recall being 13.1 and the students mean recall being 5.1. These means were also significantly different ($t=6.71$; $p < .001$).

Correlations were done between number of correct propositions and information about auditors' experience. These correlations were not signicantly different from zero. The correlation between number of correct responses and year that the students were at in their programmes was also not significantly different from zero.

Of the 76 propositions recalled by subjects, more auditors than students recalled 73. That is, for only three propositions did more students recall them than auditors. One of the propositions recalled more often by students was the fact that the bank that cheques were deposited in was the Royal Bank (7 auditors; 13 students). Another proposition was the fact that the one of the receptionist's primary duties was switchboard operation (4 auditors; 7 students). Finally, 8 students recalled the proposition that the customer master file contains all relevant information on the customer while 6 auditors mentioned this item.

Some of the differences between auditor and student recall were very large. A good example of this is the proposition - a list of cheques is prepared. Thirty-two auditors mentioned this item while only 3 students did so. Presumably auditors have seen this procedure many times and have come to expect it in an internal control system. Thus when such a procedure is included in a newly encountered internal control system, it is built into the auditor's mental model because of its connections with other cash receipts functions.

The order of recall was examined to see if subjects reinstated the natural order that was reversed in the original narrative. The five sections of the narrative were identified as A: Introduction; B: Sales; C: Collections; D: Sales; and E: Reconciliations and review.

If a reinstatement of order occurs we should observe that section D is preceded more often by section B than by other sections. This was found to be the case for auditors:

First mention of item from section D preceded by:

B	19
C	7
E	7
A	3
Total	36

For students there were only eight propositions mentioned from section D. Half of these were preceded by a proposition from section B and half were preceded by a proposition from section C.

Eighty-four auditors were asked if they utilize simulation of mental models in any of their judgments. Those that said "yes" were asked to give an example. Seventeen of the auditors said that they simulate models of internal control systems.

The results of the narrative recall task support the idea that auditors with their enormous amount of experience with internal control systems can construct models of these systems very efficiently to help them understand the system. More basic to this, the results are consistent with the maintained hypothesis of the dissertation that construction of mental models is an element of human cognition.

APPENDIX B: MEAN RESPONSES FOR EXPERIMENT 1

Table 17: Mean Responses for Part 1--Dependent Variable INVEST

EXPNOV main effect: F(1, 44) = 3.85 **

Auditors	2.9
Students	4.0

PRIME main effect: F(1, 44) = 1.53

Primed	3.1
Unprimed	3.8

EXPNOV by PRIME interaction: F(1, 44) < 1

	Auditors	Students
Primed	2.4	3.8
Unprimed	3.4	4.3

** significant at p < .10

Table 18: **Mean Responses for Part 2--Dependent Variable REGRET**

EXPNOV main effect: F(1, 40) < 1

Auditors	5.6
Students	6.0

PRIME main effect: F(1, 40) = 2.85 **

Primed	5.4
Unprimed	6.2

ACT main effect: F(1, 40) = 2.28

Action	6.2
Inaction	5.5

EXPNOV by PRIME interaction: F(1, 40) = 1.78

	Auditors	Students
Primed	4.9	5.9
Unprimed	6.3	6.1

EXPNOV by ACT interaction: F(1, 40) = 5.76 *

	Auditors	Students
Action	5.4	6.9
Inaction	5.8	5.1

PRIME by ACT interaction: F(1, 40) < 1

	Primed	Unprimed
Action	5.8	6.6
Inaction	5.1	5.8

EXPNOV by PRIME by ACT interaction: F(1, 40) = 1.78

	Auditors		Students	
	Primed	Unprimed	Primed	Unprimed
Action	5.0	5.8	6.5	7.3
Inaction	4.8	6.8	5.3	4.8

---

* significant at p < .05

** significant at p < .10

Table 19: Mean Responses for Part 2--Dependent Variable CRITICISM.

EXPNOV main effect: F(1, 40) < 1

Auditors	5.0
Students	4.8

PRIME main effect: F(1, 40) < 1

Primed	4.6
Unprimed	5.2

ACT main effect: F(1, 40) = 1.03

Action	4.7
Inaction	5.1

EXPNOV by PRIME interaction: F(1, 40) < 1

	Auditors	Students
Primed	4.7	4.6
Unprimed	5.4	4.9

EXPNOV by ACT interaction: F(1, 40) < 1

	Auditors	Students
Action	4.8	4.5
Inaction	5.3	5.0

PRIME by ACT interaction: F(1, 40) = 1.06

	Primed	Unprimed
Action	4.7	4.6
Inaction	4.6	5.7

EXPNOV by PRIME by ACT interaction: F(1, 40) = 2.92 **

	Auditors+			Students#	
	Primed		Unprimed	Primed	Unprimed
Action	5.1	##	4.5	4.2	4.8
Inaction	4.2	++	6.3	5.0	5.0

** significant at p < .10.

+ two-way interaction significant at .05 (F(1, 20) = 4.32).

# two-way interaction not significant (F(1, 20) < 1).

++ difference significant at .05 level (F(1, 10) = 4.82).

## difference not significant (F(1, 10) < 1.

APPENDIX C: EXPERIMENT 1: CHECKS OF MANIPULATIONS AND RELATED ANALYSIS

Manipulation checks:

EXPNOV:

1. Students were asked whether they had prior experience working in a Chartered Accounting firm as it had been assumed that the students did not have prior experience. All twenty-three students responding to this question had no such experience.

2. Information was collected on auditors' amount of experience and the students' major area, year in the programme and future plans. For the auditors, correlations were done between the response to the judgment task and number of years as a Chartered Accountant, number of years of audit experience and number of years as a manager. None of these correlations was significantly different from zero.

For the students, the correlation between the responses to the judgment task and the number of years in the programme was determined. The correlation was -.41 (t=-2.08; p=.05). The students earlier in the programme gave higher assessments of the likelihood that the individual in the case would become a partner in the business.

There was no relationship between responses in the judgment task and subjects' plans to become CA's, CGA's or CMA's nor was there any effect on responses of the students' major areas of study.

PRIME:

1. Forty-three of the forty-eight subjects (90%) correctly recalled the information that they had been primed with (regarding the potential for suffering losses on the Vancouver Stock Exchange).

Fisher's exact test revealed no relationship between EXPNOV and correctness of responses nor between PRIME and correctness of responses.

2. It was found that subjects' explanation of the process by which by which one could suffer a catastrophic loss trading on the Vancouver stock exchange were usually in accordance with the instructions.

3. Two questions were asked to determine whether subjects realized that they were being primed.

Of the subjects used in the analysis, none showed any indication that they realized that they were being primed. Recall that the data of two students were not used in the analysis because these students' answers to one of these questions suggested that they may have realized that the priming task was meant to influence their later responses.

4. Subjects were asked if the simulation of mental models (as described to them) may aid them in choosing an appropriate action in response to a judgment situation such as the one that they had dealt with earlier.

Thirty-seven of the subjects (77%) thought that such a process might aid them in choosing an appropriate action in response to a judgment situation such as the one that they had dealt with earlier. The answer to this question was not independent of EXPNOV (p=.010 per Fisher's exact test). Students were more likely than auditors to answer "yes" to this question.

ACT:

1. Subjects were asked in a multiple choice question to recognize the prior decision (if any) taken by the individual in the situation before changing his/her mind (if s/he did so).

Forty-two (87.5%) of subjects answered the question correctly. Fisher's exact test indicated no relationship between correctness of response and EXPNOV nor between correctness of response and ACT.

2. Subjects were asked to assess how unusual the individual's decision to become a partner in the business was (0 (not at all unusual) to 8 (extremely

unusual)).

The correlation of both REGRET and CRITICISM with the unusualness assessment were low (.10 and .00 respectively. In addition to this, there was no effect by the ACT variable on the unusualness assessment. Thus abnormality of action vs. inaction was likely not underlying the effect of ACT.

3. Subjects were asked to give the probability that another individual in the situation would have decided to become a partner in the business.

The correlation of both REGRET and CRITICISM with the assessments of probability were low (.13 and -.12, respectively). Probability assessed was not affected by ACT. Thus probability likely did not mediate the effect found for the ACT manipulation.

Related analysis:

1. Subjects were given the opportunity to describe problems that they had in completing the experimental materials. Thirty-two (67%) said that they had no problems. This was not related to experimental condition.

The dependent variables were run against a variable representing the response to this question. The variable had no effect suggesting that there was no difference between responses of those answering "yes" vs. "no" to this question.

APPENDIX D: MEAN RESPONSES FOR EXPERIMENT 2

Table 20: Mean Responses for Part 1--Dependent Variable CONCUR.[9]

EXPNOV main effect: F(1, 110) = 4.34 *

Auditors	2.8
Students	3.6

PRIME main effect: F(4, 110) < 1

1. Litigation explanation	3.3
2. Litigation exposure	3.3
3. Unprimed	3.2
4. Loss of client exposure	3.3
5. Loss of client explanation	3.0

EXPNOV by PRIME interaction: F(4, 110) < 1

	Priming condition				
	1	2	3	4	5
Auditors	2.7	2.8	3.1	2.8	2.6
Students	3.8	3.8	3.3	3.7	3.4

---

* significant at $p < .05$

Table 21: Mean Responses for Part 2--Dependent Variable REGRET.

EXPNOV main effect: $F(1, 84) = 1.37$

Auditors	4.5
Students	5.4

PRIME main effect: $F(4, 84) = 1.12$

1. Litigation explanation	5.0
2. Litigation exposure	4.5
3. Unprimed	5.3
4. Loss of client exposure	4.5
5. Loss of client explanation	5.5

ACT main effect: $F(1, 84) < 1$

Action	5.1
Inaction	4.8

FREQ main effect: $F(1, 84) < 1$

Low frequency	4.9
High frequency	5.0

EXPNOV by PRIME interaction: $F(4, 84) < 1$

	Priming condition				
	1	2	3	4	5
Auditors	4.4	4.2	4.8	4.2	4.9
Students	5.6	4.8	5.8	4.8	6.2

EXPNOV by ACT interaction: $F(1, 84) < 1$

	Auditors	Students
Action	4.5	5.7
Inaction	4.5	5.1

EXPNOV by FREQ interaction: $F(1, 84) < 1$

	Auditors	Students
Low frequency	4.6	5.2
High frequency	4.4	5.6

PRIME by ACT interaction: $F(4, 84) < 1$

	Priming condition				
	1	2	3	4	5
Action	5.1	4.3	5.8	5.3	5.2
Inaction	4.9	4.7	4.8	3.7	5.9

PRIME by FREQ interaction: $F(4, 84) < 1$

	Priming condition				
	1	2	3	4	5
Low frequency	4.3	4.3	5.1	5.1	5.7
High frequency	5.7	4.6	5.5	3.8	5.4

ACT by FREQ interaction: F(1, 84) < 1

	Action	Inaction
Low frequency	4.9	4.9
High frequency	5.3	4.7

EXPNOV by PRIME by ACT interaction: F(4, 84) < 1

	Auditors		Students	
	Action	Inaction	Action	Inaction
Prime 1	4.5	4.3	5.7	5.5
2	3.8	4.5	4.7	4.8
3	5.0	4.7	6.5	5.0
4	5.2	3.2	5.3	4.2
5	4.0	5.8	6.3	6.0

EXPNOV by PRIME by FREQ interaction: F(4, 84) < 1

	Auditors		Students	
	Low	High	Low	High
Prime 1	3.3	5.5	5.3	5.8
2	4.3	4.0	4.3	5.2
3	4.7	5.0	5.5	6.0
4	5.7	2.7	4.5	5.0
5	5.0	4.8	6.3	6.0

EXPNOV by ACT by FREQ interaction: F(1, 84) < 1

	Auditors		Students	
	Low	High	Low	High
Action	4.7	4.3	5.1	6.3
Inaction	4.5	4.5	5.3	4.9

PRIME by ACT by FREQ interaction: F(4, 84) < 1

	Action		Inaction	
	Low	High	Low	High
Prime 1	4.5	5.7	4.2	5.7
2	3.3	5.2	5.3	4.0
3	5.2	6.3	5.0	4.7
4	6.0	4.5	4.2	3.2
5	5.7	4.7	5.7	6.2

Table 22: Mean Responses for Part 2--Dependent Variable CRITICISM

EXPNOV main effect: F(1, 84) = 1.19

Auditors	5.1
Students	5.5

PRIME main effect: F(4, 84) < 1

Contrast of explanation vs. other: F(1, 84) = 3.47 **

1. Litigation explanation	5.5
2. Litigation exposure	5.1
3. Unprimed	5.1
4. Loss of client exposure	4.9
5. Loss of client explanation	5.8

ACT main effect: F(1, 84) = 5.67 *

Action	5.7
Inaction	4.9

FREQ main effect: F(1, 84) < 1

Low frequency	5.3
High frequency	5.3

EXPNOV by PRIME interaction: F(4, 84) < 1

	Priming condition				
	1	2	3	4	5
Auditors	5.2	4.5	4.9	5.3	5.7
Students	5.9	5.7	5.3	4.5	5.9

EXPNOV by ACT interaction: F(1, 84) = 1.42

	Auditors	Students
Action	5.3	6.1
Inaction	4.9	4.9

EXPNOV by FREQ interaction: F(1, 84) < 1

	Auditors	Students
Low frequency	5.1	5.5
High frequency	5.1	5.5

PRIME by ACT interaction: F(4, 84) < 1

	Priming condition				
	1	2	3	4	5
Action	5.9	5.6	5.7	5.7	5.6
Inaction	5.2	4.6	4.6	4.1	6.0

PRIME by FREQ interaction: F(4, 84) < 1

	Priming condition				
	1	2	3	4	5
Low frequency	5.1	5.2	5.3	5.2	5.6
High frequency	6.0	5.0	4.9	4.6	6.0

ACT by FREQ interaction: F(1, 84) = 2.52

	Action	Inaction
Low frequency	5.4	5.1
High frequency	6.0	4.6

EXPNOV by PRIME by ACT interaction: F(4, 84) < 1

	Auditors		Students	
	Action	Inaction	Action	Inaction
Prime 1	5.7	4.7	6.2	5.7
2	5.2	3.8	6.0	5.3
3	5.0	4.8	6.3	4.3
4	5.7	4.8	5.7	3.3
5	5.0	6.3	6.2	5.7

EXPNOV by PRIME by FREQ interaction: F(4, 84) = 1.08

	Auditors		Students	
	Low	High	Low	High
Prime 1	4.2	6.2	6.0	5.8
2	5.0	4.0	5.3	6.0
3	5.3	4.5	5.3	5.3
4	5.7	4.8	4.7	4.3
5	5.2	6.2	6.0	5.8

EXPNOV by ACT by FREQ interaction: F(1, 84) = 1.42

	Auditors		Students	
	Low	High	Low	High
Action	5.2	5.4	5.6	6.5
Inaction	4.9	4.9	5.3	4.4

PRIME by ACT by FREQ interaction: F(4, 84) < 1

	Action		Inaction	
	Low	High	Low	High
Prime 1	5.2	6.7	5.0	5.3
2	5.2	6.0	5.2	4.0
3	5.7	5.7	5.0	4.2
4	5.8	5.5	4.5	3.7
5	5.2	6.0	6.0	6.0

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* significant at $p < .05$

** significant at $p < .10$

APPENDIX E: EXPERIMENT 2: CHECKS OF MANIPULATIONS AND RELATED ANALYSIS

Manipulation checks:

EXPNOV:

1. Subjects were asked to list five potential events that they felt could occur after a typical audit, the importance of each and its likelihood. This question had been asked of auditors in a prior study by Gibbins and Wolf (1982). The responses should provide information about the assumed differences between university students and auditors as to prior knowledge about outcomes. The following procedure was used to analyse events listed by the subjects (post-audit events):

Two independent coders went through a sample of the responses to this question to identify categories of responses. The categories identified by Gibbins and Wolf (1982) were also taken into account. Each coder came up with a rough list of categories and a final coding scheme was arrived at (22 categories, together with three broad classes of categories - those related to litigation, those related to loss of client and other).

Then each coder went through all of the responses (blind to condition) and coded each response according to the coding scheme on his/her own photocopy of the responses. The codes applied by each coder were compared. It was found that 82.44% of the events were initially coded identically by both coders. Of the non-matching codes, 12% were coding errors which were corrected; 42% were categorizations of a specific category by one coder and "other" by another coder and a decision was made about whether this specific category was reasonable; and 46% were differences in interpretation which were resolved.

The post-audit events, the number of references to each event, their mean importance and their mean likelihood ratings are in Table 23.

Table 23: Mean Importance and Likelihood Ratings for Post-audit Events

Event	Auditors			Students		
	#	I	L	#	I	L
1. Inadequate audit	5	7.1	3.0	15	8.9	3.0
2. Financial statement error	54	8.4	2.2	11	8.5	4.2
3. Fraud/imbezzlement/illegal acts	22	7.6	2.6	15	8.7	3.2
4. Third party reliance (use of /response to audited financial statemts. by users)	16	4.4	4.0	39	5.2	6.0
5. Bankruptcy/insolvency/receivership	22	7.8	2.0	27	7.4	2.9
6. Quality control review	5	8.2	5.2	1	8.0	7.0
7. Tax problems	9	5.3	4.1	7	7.3	3.4
8. SEC/OSC/Government action	2	7.0	1.5	7	7.6	3.1
9. Litigation	5	9.2	1.8	6	9.0	3.3
10. Fee collection problems	18	6.3	4.5	7	5.4	5.9
11. Client dissatisfied (with audit process/audit report/audit staff/management letter)	14	6.8	4.2	18	8.2	4.4
12. Client satisfied	3	9.3	4.2	8	9.1	7.9
13. Loss of client	15	8.0	2.4	13	8.8	3.3
14. Reappointment	2	9.0	8.5	5	8.2	7.4
15. New work (new clients/new services for existing client)	7	8.7	5.4	1	10.0	6.0
16. Economic events affecting client	24	4.6	3.9	7	6.3	2.9
17. Client sold/taken over/merged/goes public	16	5.5	2.4	2	5.0	4.0
18. Change in client management	3	4.0	5.0	4	8.0	4.8
19. Change in client's accounting policies/internal control procedures						

by client	1	4.0	1.0	9	6.8	4.6
20. Events affecting audit staff (offered job/ evaluation/ turnover)	7	7.3	5.3	3	6.7	3.3
21. Routine follow-up events (meetings/ implementation of management letter points/ business as usual/ feedback/pays fee/ send out financial statements)	27	6.5	7.0	13	6.8	8.0
22. Other	8	5.6	3.6	33	8.3	5.1

#=number of subjects identifying an event in this category

I=mean importance ratings (scale 0 - no importance to 10 - extreme importance)

L=mean likelihood ratings (scale 0 - no possibility of occurrence to 10 - certain to occur)

A chi-square test was done testing the independence of the category mentioned by type of subject (auditor versus student). Similar categories were combined to avoid too many cells with expected frequency smaller than 5. (6, 7, and 8 were combined; 12, 14 and 15 were combined; 17 and 18 were combined; 20 and 21 were combined; and 19 ad 22 were combined).

Auditors and students differed as to the types of post audit events that they identified (Chi-square (14, N = 536) = 92.79; $p < .001$).

Auditors were much more likely to mention the possibility of an error in the financial statments or a fraud or illegal act. They were also more likely to mention such things as economic events affecting the client, sale/takeover/merger etc. Students often mentioned the effect on/response of financial statement users and inadequate audit.

The categories were further collapsed into three broad categories: A. events that could lead to litigation (1, 2, 3, 4, 5 and 9); B. events that could lead to loss of client (10, 11 and 13) and C. other. For these collapsed categories the EXPNOV variable was independent of event type.

A repeated measures analysis of variance was done with importance ratings as the dependent variable and EXPNOV as the independent variable. The mean importance ratings were not significantly different for auditors and students (F(1, 79) = 2.54). There was a significant difference between auditors' and students' Likelihood ratings (F(1, 79) = 10.54; p < .01). The mean likelihood was 3.6 for auditors and 4.6 for students.

An analysis was carried out to determine whether auditors' and students' importance and likelihood ratings differed for the broad category of events that could lead to litigation (1, 2, 3, 4, 5, and 9); the broad category of events that could lead to loss of client (10, 11, and 15); and the other events. Because subjects may have mentioned an item in these broad categories more than once, the ANOVAs were carried out for only the first-post audit event mentioned by each subject (to avoid within subject correlation). The independent variables were EXPNOV and the variable representing the three broad categories of events. The main effects and the two-way interaction were included in the model.

Analysis of importance ratings showed no significant results. Analysis of likelihood ratings (and also of ranks thereof) showed a signicant EXPNOV by broad category interaction (F(2, 113) = 3.57; p < .05). (The main effects were also significant). The mean likelihoods for events that could lead to litigation were 2.3 for the auditors and 4.4 for the students. The mean likelihoods for events that could lead to loss of client were 3.3 for the auditors and 4.7 for the students. The mean likelihoods for other events was 6.4 for auditors and 5.6 for students.

These results provide evidence of the validity of the underlying assumption of different knowledge of the audit enviroment by auditors and students.

2. Students were asked whether they had had prior

experience working in a Chartered Accounting firm as it had been assumed that the students did not have prior experience. Four of the sixty students answered "yes" to this question. These students had worked only four months or less (summer job).

3. Information was collected on the amount of experience that the auditors had (number of years as a chartered accountant, number of years of auditing experience, number of years as a manager). Correlations of these factors and the auditors' responses to the judgment task were measured. The correlations were not significantly different from zero.

Information was collected on the students' major areas, year in the programme and future plans (CA, CGA, or CMA). The correlations of the responses to the judgment task and the year in the programme was not significantly different from zero. Regression of the likelihood assessment in the judgment task against the students' major area showed no significant results (F < 1). There was also no relationship between the likelihood assessments and plans for becoming a CA, CMA or CGA.

PRIME:

1. Subjects were given a multiple choice question

requiring them to recognize the information that they were primed with. Of the 120 subjects, 91% answered the question correctly. The chi-square test indicated that correct vs. incorrect response was unrelated to the type of subject (auditor vs. student) or to priming condition.

2. The answers given by subjects in the explanation conditions provided additional information which could be used to assess the impact of the priming manipulation. It was observed that most subjects did answer the question in accordance with the instructions. However, there was some amount of variance in the level of detail of the description given by subjects in describing the course of events leading up to either litigation or loss of client. Also there were a few responses to this question that were so brief as to possibly not cause the priming effect. All of this would work against the possibility of finding a difference among conditions.

3. Analysis done on responses to the post-audit event question (described under EXPNOV) was expected to provide evidence as to whether the priming information had been attended to. That is, the events mentioned and the likelihood and importance ratings could be affected by the way that the subject was primed.

Recall that 22 categories of events were coded and that for some analyses these categories were collapsed in three broad categories (events that could lead to litigation, events that could lead to loss of client, and other events).

A contingency table showing frequency of response for each of the 22 categories of post-audit events by priming condition was the basis of a chi-square test of independence. Chi-square(84, N=536) was 105.96 indicating a significance level .05. This effect shows that the specification of post audit events may have been related to the priming condition. This result should be interpreted with caution due to the fact that more than 20% of had an expected frequency of less than five.

A second contingency table showed frequency of response for each of the three broad categories described above by priming condition. The chi-square test shows that the category frequencies were not independent of priming condition (Chi=square(8, N=536) = 20.02; $p < .05$). This appears to be caused in part by the fewer mentions of litigation related items by those in the loss of client explanation condition (38) than would be expected under independence (51) and a correspondingly greater number of other events (63) than expected under independence (46). These were the largest two deviations from expected frequencies. Thus priming may have affected the post-audit events listed by subjects.

Analysis was done on the first post audit event mentioned by each subject using importance ratings as dependent variable and broad category of response (litigation related, loss of client related, other) and PRIME as independent variables. (Only the first event was analysed due to the potential problem with within subject correlation when doing ANOVA with all events mentioned by each subject.)

There was no interaction between the broad categories of events and the priming variable. A similar result occurred for the likelihood assessments. The lack of a differential effect on the first mentioned importance and likelihood assessments for different conditions of the priming variable is evidence against the possibility that priming affected these assessments.

4. Subjects were asked after assessing regret and criticism of the auditor to give the probability that a randomly chosen auditor would have concurred with the client. There were few extreme answers. The modal response was .1 which was suggested in the information

provided to the subjects (1 of 10 or 10 of 100 auditors would recognize inducement in the current year).

This is evidence against the possibility that subjects had very strong views on the accounting issue dealt with in the judgment situation.

5. Subjects were asked to give their opinion as to the proportion of auditors that would recommend the accounting treatment that was used by the client.

Twenty-three subjects (19%) estimated that less than 10% of auditors would recognize the inducement in the current year. One subject estimated that greater than 90% would do so. It appears that those believing in the spreading method may hold the beliefs quite strongly thus reducing the probability of observing a priming effect.

6. Two questions were aimed at determining whether subjects realized that they were being primed.

The responses to these questions suggested that no subjects in this experiment realized that the priming task was meant to influence later responses.

7. Students were asked to indicate any parts of the experiment that made them think about the consequences of judgments made by auditors. This question was intended to reveal whether priming (particulary in the explanation condition) had the effect of teaching the

students the relevant contingency relationships. This possibility was discussed in footnote 5.

Of the 60 students, 51 said that some aspect of the experiment made them think about the consequences of judgments made by auditors. The items listed were as follows (some subjects listed more than one item):

Judgment situation	26
Bankruptcy of client/ensuing lawsuit	14
Post-audit event question	6
Litigation (no specific part of materials mentioned	5
Loss of client (no specific part of materials mentioned	1
Litigation in narrative	1
Other	6

The lack of subjects indicating that the priming task made them think about consequences auditor judgment suggests that a teaching effect did not occur. Priming condition was not related to response to this question.

8. Subjects were asked if simulation of mental models (as described to them) may aid them in choosing an appropriate action in response to a judgment situation such as the one that they had dealt with earlier. Seventy-eight per cent of the subjects answered "yes" to this question.

ACT:

1. Subjects were, in a multiple choice question,

required to recognize the prior position (if any) taken by the auditor.

Of the 120 subjects, 90 (75%)[8] answered this question correctly. There was no relationship between correct answer frequency and EXPNOV or ACT.

2. The subjects were also asked to assess how unusual the auditor's decision to concur was.

The correlation between REGRET and the assessment of unusualness was .35 (significant at $p < .05$). The correlation between CRITICISM and the assessment of unusualness was .28 (significantly different from zero - $p < .05$). This is consistent with the idea that the abnormality of the auditor's action may have been what underlay the REGRET and CRITICISM assessments. However, since the effect of ACT on the unusual assessment was not significant, it appears that it wasn't perceived abnormality of the action in this task that caused effect of the ACT variable on the CRITICISM assessment.

3. Subjects were asked to give the probability that a randomly chosen auditor would have concurred with the client. The ACT manipulation did not significantly affect the probability as it had the criticism assessments. Thus probability was likely not a mediating variable in the criticism assessment.

FREQ:

1. Subjects were asked to recall the proportion of auditors questioned that would recommend the accounting treatment used by the client. Of the 120 subjects 106 (88%) answered this question correctly (i.e. 1 of 10 in the low frequency condition and 10 of 100 in the high frequency condition).

2. Subjects were asked their own opinion of the proportion of auditors that would recommend the accounting treatment that was used by the client.

The mean response was equivalent to a probability of .281. Only 22 (18%) of the 120 subjects gave a proportion that was the same as had been given in the case information and which most subjects had correctly recalled in the previous question. This disbelief of the manipulated information would reduce the likelihood of observing an effect for this variable.

Related analysis:

1. Subjects were given the opportunity to describe problems that they had in completing the experimental materials. Of the 120 subjects, 74 said that they had no problems. The dependent variables were regressed against a variable representing the subjects' response to this question (yes or no) to see if responses differed significantly for those saying that they had

problems. There was no difference ($F < 1$).

APPENDIX F: EXPERIMENT 1: INSTRUMENT

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The questions in this set of materials have been carefully constructed to cover various aspects of judgment including memory. Each question plays an important role and has already been pre-tested with individuals at your experience level.

The purpose of this experiment is to study the retention of and inferences drawn from narrative materials by individuals with varying levels of experience. In other areas of research it has been observed that experienced individuals can draw upon a wealth of knowledge that affects the way they understand and interpret what they read.

You are asked to carefully read two narratives and answer the questions following each narrative. Some of the questions may require that you recall specific information from the narratives. Do not turn back to the narrative once you have gone to the question sheet.

Narrative 1:

The Vancouver Stock Exchange is a unique phenomenon in North America. It is the only exchange where junior companies can quickly raise capital for speculative resource ventures.

The exchange was founded in 1907 to assist in the growth of the resource-based British Columbia economy. The Vancouver Stock Exchange came into its own in the mid 1960's when Ontario imposed tough regulations on mining promotions. The Vancouver exchange, with its relatively permissive regulations, soon replaced the Toronto Stock Exchange as the trading centre for speculative stocks.

Many speculators have made their fortunes through the Vancouver Stock Exchange. However, the potential for suffering losses when trading on this exchange is well known.

Recently, somewhat tighter regulations, an enlarged staff, and new facilities have brought a measure of respectability to the exchange. The Vancouver Stock Exchange is now described by many as "North America's premier venture capital exchange."

Please provide a brief summary of the narrative that you have just read.

The possibility of suffering losses when trading on the Vancouver Stock Exchange was mentioned in the narrative. Please explain the process (i.e. describe the sequence of events) by which one might suffer a catastrophic loss.

In your view, does Canada benefit from the existence of the Vancouver Stock Exchange?

Narrative 2:

Atkinsons Ltd. is a wholesale distributer of hardware. Accounting personnel are perceived to be competent and trustworthy. However, there has recently been some turnover in the accounting department. The company's management considers it a priority to ensure that accounting information is reliable and timely and that business is conducted efficiently. The company's sales-collection cycle operates as follows:

Customer orders are keyed into the computer daily and are processed against the customer master file. (The customer master file contains all relevant information about the customer and serves as the accounts receivable subsidiary ledger.) If the order is for a customer not already on file or for one listed as inactive a report is delivered to the sales manager. Authorization must be obtained from the sales manager to add the customer to the master file or to change its status. If the customer order exceeds the credit limit or if the customer's unpaid account is 60 days old or more, a report is sent upstairs to the credit manager who must give special authorization to continue with the transaction.

Cheques are received by the receptionist whose primary responsibilities involve switchboard operation and mail opening. The receptionist is not involved in the order taking or transaction recording process. Cheques are accompanied by a copy of the sales invoice. The cheques are immediately endorsed and a list is made with invoice copies attached. A deposit slip is prepared in duplicate and the cheques are deposited daily to the Royal Bank. The cheque list is sent to the key ~~operator who~~ keys the information into the computer so that the customer master file and the cash receipts transaction files can be updated.

Sales orders are printed using information from the customer order and the customer master file. They serve as a basis for preparation of bills of lading and shipment of goods. Once information from the bills of lading is keyed in, prenumbered sales invoices are printed and the monthly sales transaction file and the customer master file are updated. Copies of bills of lading, sales orders, customer orders, and sales invoices are compared to ensure that goods ordered are correctly shipped and correctly billed.

Monthly statements are sent to customers. The total of customer accounts from the master file is reconciled to the accounts receivable balance in the general ledger and the bank is reconciled monthly by the accounts clerk who is not involved in the order taking, recording or cash receipts functions. All reconciliations are performed by this clerk.

During all phases of computer processing, totals are compared to ensure that no records have been lost or processed incorrectly. In this way accuracy and completeness can be maintained. Summary reports are generated on a weekly and monthly basis and are examined by the company president who compares them with reports of prior periods for reasonableness.

In your view, what are three important features of the system?

How would you rate internal control in this system overall in terms of its ability to prevent/detect error or fraud?

```
0------1------2------3------4------5------6------7------8
Extremely                                            Extremely
  weak                                                strong
```

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In this experiment, we are interested in finding out how you approach a difficult judgment situation for which there is no definitive solution.

You are asked to carefully read the following problem situation. You will then be asked how the problem might be dealt with based on this rather general information.

Pat Thompson, a young financial analyst employed by a large brokerage firm, has been deliberating over a chance to become a partner in a business that intends to produce and market an innovative new product. Pat has been asked to contribute $250,000. To raise this sum, all of Pat's life savings would be required (now invested in Guaranteed Investment Certificates) and a large personal loan would be taken out. However, it is believed that if this product takes off, the partners could become multi-millionaires.

In your opinion, what is the likelihood that Pat Thompson will decide to become a partner in this business? (Circle the number that most closely represents your view.)

0------1------2------3------4------5------6------7------8

0	2	4	6	8
There is absolutely no chance that Pat will decide to become a partner in this business.	There is a slight chance that Pat will decide to become a partner in this business.	There is a reasonable chance that Pat will decide to become a partner in this business.	There is a good chance that Pat will decide to become a partner in this business.	Pat will definitely decide to become a partner in this business.

What would you do in this situation? (Circle the letter beside the action that you prefer.)

a. Become a partner in the business.
b. Do not become a partner in the business.
c. Other. Specify:

Briefly explain your reasoning.

After the completion of a financial statement audit (after the audit report has been issued, the billing has been sent and the management letter has been written) one can expect it to continue to have impacts. Please list five potential events that you feel could occur after a typical audit. For each item listed please indicate:

a) the degree to which each potential event's occurrence would matter to an auditor personally (in terms of income, reputation in the firm, or pride in and satisfaction from work) on a scale of 0 (no importance) to 10 (extreme importance), and

b) the likelihood of this event's occurrence on a scale of 0 (no possibility of occurrence) to 10 (certain to occur).

Potential events	(a) Importance (0 to 10)	(b) Likelihood (0 to 10)
1. ________________	________	________
2. ________________	________	________
3. ________________	________	________
4. ________________	________	________
5. ________________	________	________

Recall that in the judgment situation that you dealt with, Pat Thompson was deliberating over a chance to become a partner in a business.

Pat Thompson initially decided not to become a partner in the business and notified the other potential partners of this decision. After giving the matter further consideration, Pat decided to become a partner in the business after all.

As it turned out, the product was not successful and the business had to close. Pat is still paying off the personal loan.

How much regret does Pat Thompson feel? (Circle the number that most closely represents your assessment.)

```
  0------1------2------3------4------5------6------7------8
  No                                                   Extreme
regret                                                 regret
```

To what extent will Pat be criticized by others due to this incident?

```
 0------1------2------3------4------5------6------7------8
Not at                                                Severely
 all
```

What is the probability that another person in Pat's situation would have decided to become a partner in the business?

0—.10—.20—.30—.40—.50—.60—.70—.80—.90—1.00

Was there any recent event or any experience within this experimental setting that influenced or might have influenced you in the way that you responded in the judgment situation?
Yes ☐ No ☐
If Yes, please explain.

It has been suggested that perhaps experts in a particular field develop "mental models" of certain real world systems related to that field. For example, a regulator in a nuclear power plant may have a mental model of the system which he/she is monitoring. An engineer may be able to envision the result of a design change in a bridge by simulating the effect of the change in his/her mind.

Do you think that you may use simulation of mental models in your judgments? Yes ☐ No ☐

If Yes, can you give an example?
If No, please explain.

Page 5

Do you think that such a thought process may aid you in choosing an appropriate action in response to a judgment situation such as the one that you dealt with earlier?
Yes [] No []
Please explain.

Did the first narrative that you read mention the potential for suffering losses when trading on the Vancouver Stock Exchange?
Yes [] No []

Recall that Pat Thompson decided to become a partner in the business. Pat's initial decision was: (Circle the letter beside the response that most closely corresponds to what you read.)

a. No mention was made of Pat's having made any other decision than to become a partner in the business.
b. Pat initially decided not to become a partner in the business.
c. Pat's initial decision was to ask for more time to raise the money.
d. None of the above. Specify:

To what extent do you think Pat's decision to become a partner in the business would be considered unusual for someone in that situation? (Circle the number most closely representing your view.)

0------1------2------3------4------5------6------7------8

Not at all unusual — Extremely unusual

The second narrative described an internal control system. Please write down as much information from that narrative as you can recall.

Please list what you view to be the most difficult accounting issues faced by accountants today.

Did you have any problems completing the experiments?
Yes [] No []
If Yes, please explain.

Did participation in these experiments in one sitting cause you any problems? That is, did one experiment influence or hinder you in responding to another?
Yes [] No []
If Yes, please explain.

Year that you became a CA ________

Number of years auditing experience________

Number of years as a manager_______

Male [ ]   Female [ ]

Thank you very much for your participation.
If you would like a summary of the results of this research please complete the next page and tear it off. You may give the page to the experimenter or mail it to the University of Alberta.

Complete this page *only* if you would like a summary of the results of this research to be mailed to you.

I would like a summary of the results of this research.

Name ______________________

Address ______________________

____

____

Give this sheet to the experimenter (separate from your experimental materials) or mail it to :

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University of Alberta
Edmonton, Alberta
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APPENDIX G: EXPERIMENT 2: INSTRUMENT

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Telephone (403) 432-2753

The questions in this set of materials have been carefully constructed to cover various aspects of judgment including memory. Each question plays an important role and has already been pre-tested with individuals at your experience level.

The purpose of this experiment is to study the retention of and inferences drawn from narrative materials by individuals with varying levels of experience. In other areas of research it has been observed that experienced individuals can draw upon a wealth of knowledge that affects the way they understand and interpret what they read.

You are asked to carefully read two narratives and answer the questions following each narrative. Some of the questions may require that you recall specific information from the narratives. Do not turn back to the narrative once you have gone to the question sheet.

Narrative 1:

The evolution of the accounting profession in North America began late in the nineteenth century. The first accounting body to become incorporated in North America was The Association of Public Accountants in Montreal. Even in these early times, public accountants provided a wide variety of accounting services in addition to the commercial audit.

The ensuing decades have yielded tremendous growth in the profession. The number of public accountants in North America has increased nearly one-thousand fold since the turn of the century. The range of services offered by public accountants has also increased over this time period.

The 1950's gave accountants the opportunity to expand involvement in the provision of management services. The performance of tax services also came into being during this period. By the 1980's the practising accountant was recognized as one providing accounting, auditing, taxation and management advisory services.

The evolution of the profession has not been without its problems. For example, the instances of litigation against auditors and the large amounts of damages assessed have been a source of concern in the profession. However, despite these problems the story of the accounting profession has been one of success, growth, and increasing public visibility and respect.

What does the future hold? It has been suggested that the future role of the public accountant is as an "Independent Information Professional." Public accounting firms are envisioned as offering an ensemble of services all related to the provision of information. The information revolution has made and will continue to make the information gathering and analysis skills of the public accountant invaluable in North American society.

Please provide a brief summary of the narrative that you have just read.

The profession's problem with litigation was mentioned in the narrative. Please explain the process (i.e. describe the sequence of events) by which an auditor might find himself or herself in a litigation situation.

There was a short discussion of the future of the profession in the narrative. Briefly give your view of the future.

Narrative 2:

Atkinsons Ltd. is a wholesale distributer of hardware. Accounting personnel are perceived to be competent and trustworthy. However, there has recently been some turnover in the accounting department. The company's management considers it a priority to ensure that accounting information is reliable and timely and that business is conducted efficiently. The company's sales-collection cycle operates as follows:

Customer orders are keyed into the computer daily and are processed against the customer master file. (The customer master file contains all relevant information about the customer and serves as the accounts receivable subsidiary ledger.) If the order is for a customer not already on file or for one listed as inactive a report is delivered to the sales manager. Authorization must be obtained from the sales manager to add the customer to the master file or to change its status. If the customer order exceeds the credit limit or if the customer's unpaid account is 60 days old or more, a report is sent upstairs to the credit manager who must give special authorization to continue with the transaction.

Cheques are received by the receptionist whose primary responsibilities involve switchboard operation and mail opening. The receptionist is not involved in the order taking or transaction recording process. Cheques are accompanied by a copy of the sales invoice. The cheques are immediately endorsed and a list is made with invoice copies attached. A deposit slip is prepared in duplicate and the cheques are deposited daily to the Royal Bank. The cheque list is sent to the key operator who keys the information into the computer so that the customer master file and the cash receipts transaction files can be updated.

Sales orders are printed using information from the customer order and the customer master file. They serve as a basis for preparation of bills of lading and shipment of goods. Once information from the bills of lading is keyed in, prenumbered sales invoices are printed and the monthly sales transaction file and the customer master file are updated. Copies of bills of lading, sales orders, customer orders, and sales invoices are compared to ensure that goods ordered are correctly shipped and correctly billed.

Monthly statements are sent to customers. The total of customer accounts from the master file is reconciled to the accounts receivable balance in the general ledger and the bank is reconciled monthly by the accounts clerk who is not involved in the order taking, recording or cash receipts functions. All reconciliations are performed by this clerk.

During all phases of computer processing, totals are compared to ensure that no records have been lost or processed incorrectly. In this way accuracy and completeness can be maintained. Summary reports are generated on a weekly and monthly basis and are examined by the company president who compares them with reports of prior periods for reasonableness.

How would you rate internal control in this system overall in terms of its ability to prevent/detect error or fraud? (Circle the number most closely representing your assessment.)

```
    0------1------2------3------4------5------6------7------8
Extremely                                                Extremely
  weak                                                     strong
```

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In this experiment, we are interested in finding out how you approach a difficult judgment issue for which there is no definitive solution.

You are asked to carefully read the following problem situation. You will then be asked questions about how the problem might be dealt with.

The audit of Diversified Ltd. for the year ended December 31, 1987 was near completion. The manager in charge of the audit, Pat Thompson, was deliberating over the acceptability of Diversified Ltd.'s proposed disclosure in the following situation:

Diversified Ltd. has leased five floors for office space in a downtown office building from Rental Properties Limited which owns the building. Under the rental agreement, Diversified Ltd. is paying $500,000 per year for 15 years, starting on January 1, 1987, and will have a renewal option for the following 10 years. Rental Properties Limited agreed to pay Diversified Ltd. $400,000 as an inducement to have a prestigious tenant like Diversified Ltd. in the building. (Pat considers the inducement to be material.) There is no requirement to refund the inducement if the lease is cancelled or renegotiated. $200,000 of this amount was paid on January 1, 1987 and $200,000 of the amount was paid on January 1, 1988.

Diversified Ltd. has recognized the $400,000 inducement in income for the year ended December 31, 1987. Pat realized that the CICA Handbook does not address this issue and has found that there is no real consensus among accountants as to the proper treatment. In your opinion, what is the likelihood that Pat Thompson will recommend concurrence with this accounting treatment? (Circle the number that most closely represents your view.)

0------1------2------3------4------5------6------7------8

0	2	4	6	8
There is absolutely no chance that Pat will recommend concurrence with this accounting treatment.	There is a slight chance that Pat will recommend concurrence with this accounting treatment.	There is a reasonable chance that Pat will recommend concurrence with this accounting treatment.	There is a good chance that Pat will recommend concurrence with this accounting treatment.	Pat will definitely recommend concurrence with this accounting treatment.

What course of action do you recommend in this situation? (Circle the letter beside the accounting treatment that you prefer.)

a. recognize entire inducement in 1987.
b. recognize $200,000 of inducement in 1987 and $200,000 in 1988.
c. recognize the inducement over the term of the lease.
d. recognize the inducement over the term of the lease plus renewal option period.
e. Other, specify:

Briefly explain your reasoning.

How often have you encountered judgment situations involving recognition of inducements (as in this case) or similar issues?

0------1------2------3------4------5------6------7------8
Never Routinely

After the completion of a financial statement audit (after the audit report has been issued, the billing has been sent and the management letter has been written) one can expect it to continue to have impacts. Please list five potential events that you feel could occur after a typical audit. For each item listed please indicate:

a) the degree to which each potential event's occurrence would matter to an auditor personally (in terms of income, reputation in the firm, or pride in and satisfaction from work) on a scale of 0 (no importance) to 10 (extreme importance), and

b) the likelihood of this event's occurrence on a scale of 0 (no possibility of occurrence) to 10 (certain to occur).

Potential events	(a) Importance (0 to 10)	(b) Likelihood (0 to 10)
1. ______	______	______
2. ______	______	______
3. ______	______	______
4. ______	______	______
5. ______	______	______

Recall that in the judgment situation that you dealt with the client, Diversified Ltd., recognized the entire $400,000 inducement in the year ended December 31, 1987.

Pat Thompson's initial position on the issue (which Pat noted in the file) was to require recognition of the inducement over the term of the lease. After a meeting with the management of Diversified Ltd. about the issue, Pat decided that recognition of the entire $400,000 inducement in the year ended December 31, 1987 would be appropriate and amended the file accordingly.

Some time after the audited financial statements were issued, Diversified Ltd. went bankrupt and the auditors were sued by an investor. One of the issues under contention was the accounting treatment of the inducement. The investor decided that he would check with other auditors about the issue. He found that 1 out of 10 auditors questioned would recommend bringing the entire inducement into current income.

How much regret does Pat Thompson feel? (Circle the number that most closely represents your assessment.)

```
0------1------2------3------4------5------6------7------8
No                                                   Extreme
regret                                                regret
```

To what extent will Pat be criticized by others due to this lawsuit?

0------1------2------3------4------5------6------7------8
Not at all
Severely

What is the probability that a randomly chosen auditor would have concurred with Diversified Ltd.'s treatment of the inducement?

0——.10——.20——.30——.40——.50——.60——.70——.80——.90——1.00

Was there any recent event or any experience within this experimental setting that influenced or might have influenced you in the way that you responded in the judgment situation?
Yes [] No []
If Yes, please explain.

It has been suggested that perhaps experts in a particular field develop "mental models" of certain real world systems related to that field. For example, a regulator in a nuclear power plant may have a mental model of the system which he/she is monitoring. An engineer may be able to envision the result of a design change in a bridge by simulating the effect of the change in his/her mind.

Do you think that you may use simulation of mental models in your judgments? Yes [] No []

If Yes, can you give an example?
If No, please explain.

Do you think that such a thought process may aid you in choosing an appropriate action in response to a judgment situation such as the one that you dealt with earlier?
Yes [ ]   No [ ]
Please explain.

What problem was mentioned as being faced by the accounting profession in the first narrative that you read? (Circle the letter beside the best response.)
a. Government intervention in the setting of accounting standards.
b. Litigation against auditors.
c. Strong competition making the potential for loss of clients more apparent.
d. There were no specific problems mentioned.
e. None of the above. Specify:

Recall that Pat Thompson concurred with Diversified Ltd.'s accounting treatment for the inducement (bringing the entire inducement into the current year's income). Pat's initial position before meeting with the management of Diversified Ltd. was: (Circle the letter beside the response which most closely corresponds to what you read.)

a. No mention was made of Pat's having an initial position prior to meeting with the management of Diversified Ltd.
b. Pat's initial position was to require recognition of $200,000 of the inducement in 1987 and $200,000 in 1988.
c. Pat's initial position was to require recognition of the inducement over the term of the lease.
d. Pat's initial position was to require recognition of the inducement over the term of the lease plus the renewal option period.
e. None of the above. Specify:

To what extent do you think that Pat's decision to concur with the client's accounting treatment would be considered unusual for someone in that situation.

0------1------2------3------4------5------6------7------8

Not at all unusual

Extremely unusual

What proportion of auditors would recommend bringing the entire inducement into the current year's income according to the investor that was suing the auditors?

______ out of _______ auditors.

What proportion of auditors do you estimate would recommend bringing the entire inducement into the current year's income?

_____ out of _______auditors.

The second narrative described an internal control system. Please write down as much information from that narrative as you can recall.

Did you have any problems completing the experiments?
Yes []   No []
If Yes, please explain.

Did participation in these experiments in one sitting cause you any problems? That is, did one experiment influence or hinder you in responding to another?
Yes [] No []
If Yes, please explain.

Did any parts of the experiments that you participated in make you think about the consequences to an auditor of the judgments that he or she makes?
Yes ☐ No ☐
If so, what parts?

What is your major?__________________

What year are you in your programme? _______

Male ☐ Female ☐

Have you ever been employed by a firm of Chartered Accountants?
Yes ☐ No ☐
If Yes, for how long and in what capacity?

Do you plan to become a CA? Yes ☐ No ☐ Unsure ☐
CMA? Yes ☐ No ☐ Unsure ☐
CGA? Yes ☐ No ☐ Unsure ☐

Thank you very much for your participation.
If you would like a summary of the results of this research please complete the next page and tear it off. You may give the page to the experimenter or mail it to the University of Alberta.

Complete this page *only* if you would like a summary of the results of this research to be mailed to you.

I would like a summary of the results of this research.

Name ______________________

Address ______________________
____
____

Give this sheet to the experimenter (separate from your experimental materials) or mail it to :

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MAJOR:

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MINORS:

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PREVIOUS DEGREES & PROFESSIONAL DESIGNATIONS:

C.A., Institute of Chartered Accountants of Saskatchewan, 1982
M.Sc. (Accounting), University of Saskatchewan, 1980
B.Comm. Great Distinction, (Accounting), University of Saskatchewan, 1979
C.M.A., Society of Management Accountants of Saskatchewan, 1976

Ph.D. EXPECTED: 1989

AWARDS:

1987-	Business Ph.D. Award, University of Alberta
1986-1987	Social Sciences and Humanities Research Council of Canada - Doctoral Fellowship
1986-1987	University of Alberta - Graduate Faculty Fellowship
1985-	Graduate Assistantship, University of Alberta
1982	Institute of Chartered Accountants of Saskatchewan - gold medal for highest standing in Saskatchewan in the 1981 Uniform Final Examination
1979	Laimon Academic Award and Solomon Livergant Prize for the most distinguished Commerce graduate of the 1979 class
	University of Saskatchewan - Graduate Fellowship and Graduate Scholarship
1978	Thorne Riddell Scholarship and SED Systems Scholarship
1977	University of Saskatchewan - Undergraduate Scholarship
1976	Valedictorian - Convocation of Society of Management Accountants of Saskatchewan, November 1976
1975	Society of Management Accountants of Saskatchewan - medals for highest standing in Saskatchewan in Financial Management, Organizational Behavior, Quantitative Methods II
1973	Saskatchewan Technical Institute - Accounting Scholarship

.../2

PUBLICATIONS & PRESENTATIONS:

"Independence of External Auditors: A Canadian Perspective," [with D. Lindsay, G. Murphy & H. Silvester], Advances in International Accounting, 1987, 1, 169-189.

"Perceptions of Auditor Independence in Canada: An Empirical Study," [with D. Lindsay, G. Murphy & H. Silvester]. Presented at American Accounting Association: Western Regional Meeting, 1983.

"Independence of Auditors: An Empirical Study of the Adams Report," [with D. Lindsay, G. Murphy & H. Silvester], Proceedings of the Canadian Academic Accounting Association Conference, 1982.

"Perceptions of Auditor Independence in Selected Client-auditor Relationships," [with D. Lindsay, G. Murphy & H. Silvester]. Presented at Atlantic Schools of Business Conference, 1982.

WORKING PAPERS:

"Responsibility Assessments for Auditor Negligence," 1987.
"Auditing Students' Assessment of Relative Risk," 1987.
"Explosion of the Space Shuttle Challenger: The Stock Market Reaction in the American Aerospace Industry," 1986.

TEACHING & RESEARCH INTERESTS:

TEACHING: Auditing; financial accounting; managerial accounting.

RESEARCH: Auditor judgment; litigation of auditors.

WORK EXPERIENCE:

1982-1985	Assistant Professor, University of Regina
1980	Sessional Lecturer, University of Saskatchewan
1974-1982	Accountant - Peat, Marwick, Mitchell & Co., Regina, Saskatchewan

September-April 1977, 1978, 1979 & September 1979-August 1980 — on leave to attend University

ASSOCIATIONS:

American Accounting Association
Canadian Academic Accounting Association
Institute of Chartered Accountants of Alberta
Institute of Chartered Accountants of Saskatchewan
Society of Management Accountants of Alberta